TERRA

THE NATURAL HISTORY
MUSEUM OF
LOS ANGELES COUNTY

VOLUME 27, NO. 5–6
SUMMER 1989

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San Joaquin Kit Fox
Vulpes macrotis mutica
*The exhibition **Sliding Toward Extinction: California's Vanishing Wildlife,** on display at the museum from June 24 to September 17, features portraits of endangered animals and plants from the state to serve as guides to greater knowledge of the complexity and fragility of California's natural heritage. This tiny fox lives in the San Joaquin Valley and the Carrizo Plain in San Luis Obispo County. It once ranged as far north as the San Francisco Bay area, but habitat loss, burrow cave-ins caused by off-road vehicles, poisoning, and illegal shooting and trapping have caused hundreds of San Joaquin kit fox deaths every year. See page 20 for more about California's disappearing wildlife.*

T E R R A

THE MEMBERS' MAGAZINE
OF THE
NATURAL HISTORY MUSEUM
OF LOS ANGELES COUNTY

VOLUME 27, NO. 5–6
MAY/JUNE/JULY/AUGUST 1989

COVER: Totemic dog sculpture, 1962. Artist unknown, Western Cape York Peninsula. Painted wood and nails, 43 cm. Photograph by Michal Kluvanek for South Australian Museum.

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Telephone: 805 / 496-3500
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MUSEUM ON THE MOVE

FROM THE DIRECTOR

This issue of TERRA is a precursor of great things to come—as well as a reminder of things past. When the Natural History Museum members' magazine was founded nearly twenty-eight years ago, it was called the *Quarterly* and it was issued, appropriately enough, four times a year. In 1970 the magazine was renamed TERRA (Latin for earth) to emphasize the museum's "interest in all-things about and of this earth," as the magazine's founding editor, the late Dorothy H. Seligman, put it. In the two decades since that name change, the magazine has indeed had an international focus, reflecting the museum's research concerns in all parts of the globe and its worldwide exhibition program, highlighted by the recent **Nomads: Masters of the Eurasian Steppe** exhibition produced with the U.S.S.R.'s Academy of Sciences.

We are returning to the quarterly format (the magazine was issued as a bimonthly starting in 1983) to allow us to expand TERRA and bring you more in-depth articles about the museum's research and exhibitions (as an example, see "An Introduction to the Predynastic Period in Egypt" on page 34). This issue, the first in the magazine's enlarged format, is combined numbers 5 and 6 (May/June/July/August) of Volume 27. The TERRA you receive in late August, the Fall 1989 issue, will be the first in the new quarterly series.

We are proud of the museum and its accomplishments and want to show it by the care we take with the magazine. We are also grateful to the museum's members for their support of our programs and academic concerns.

Dr. Craig C. Black

RESEARCH NEWS

Museum's Fish Hatchery Gets Boost from Halibut Derby. For the past four years, proceeds from a fishing tournament designed to promote fishing for sport have helped raise brood stock at the fish hatchery in Redondo Beach jointly operated by the Natural History Museum and Occidental College. During the past year about 50,000 juvenile halibut raised in the hatchery have been released into local waters.

Museum researchers hope that the halibut hatchery program will help to determine whether hatcheries can significantly increase ocean populations of halibut. Organizers of the Santa Monica Bay Halibut Derby hope to ensure a steady supply of halibut for tournament contestants.

Dr. Robert Lavenberg, head of the museum's halibut hatchery program, supervises five full-time employees who raise and mark two-month-old halibut, release them into the ocean, and then periodically attempt to catch as many of the marked fish as possible to monitor their growth in the wild. Halibut reach sexual maturity at three years. The group has also experimented with a hormone that stimulates halibut to spawn in captivity. Since 1986, the group has improved the survival rate of halibut raised in the hatchery from about 10 percent to between 50 and 75 percent. The hatchery was started five years ago.

According to Lavenberg, because the first halibut raised in the hatchery were only released last year, it will take at least another two years of careful monitoring before museum researchers will know if the hatchery program has actually met its goal of enhancing the halibut population.

Principally funded by the California Department of Fish and Game, the museum's halibut hatchery is part of the Ocean Research Enhancement and Hatchery Program, which includes research projects at Sea World, U.C. Davis, and California State University Northridge, as well as the Natural History Museum. The museum hatchery is one of two included in the project; Sea World in San Diego operates a hatchery program for white sea bass.

This year's Halibut Derby was held April 1–2. Twenty percent of the Derby's profits will be donated to the Natural History Museum's halibut hatchery program and 80 percent will go to the Boy's Club Westside Fishing Program. Last year, the derby donated more than $7,000 to the museum. For more information on the Halibut Derby contact John Bourget at 213/450-5131.

Chief Curator's Sea Life Research. According to Chief Curator of Life Sciences Dr. Daniel M. Cohen, a diet of cabbage soup every day for two months was a small price to pay for the opportunity to participate in a scientific cruise of the western Indian Ocean on board the research vessel *Vityaz*, flagship of the Institute of Oceanology of the U.S.S.R. Academy of Sciences. Dr. Cohen was one of an international group of marine biologists from Australia, Canada, Denmark, England, and Germany, as well as the United States and the Soviet Union, that investigated sea life from coral reefs to depths of 3,500 meters off Madagascar, Mozambique, and points south.

Bug Strikes Back—Entomology Curator Suffers Rare Mosquito-Borne Disease. During his life-long career as an insect collector specializing in Diptera, Museum Curator of Entomology Dr. Charles L. Hogue has literally sent thousands of flies and mosquitoes to their eternal homes. In summer 1988, while leading a UCLA Extension group along rainforest trails at the Tambopata Forest Preserve in southeastern Peru, one mosquito retaliated. A few

Continued on p. 6

"Two Men Dreaming at Kulunjarranya," 1984. Tommy Lowry Japaljarri, Kintore, Central Australia. Acrylic on canvas.

The Westside Pavilion is pleased to support the Natural History Museum of Los Angeles County in its exhibition of "Dreamings: The Art of Aboriginal Australia," on display May 13–August 6, 1989.

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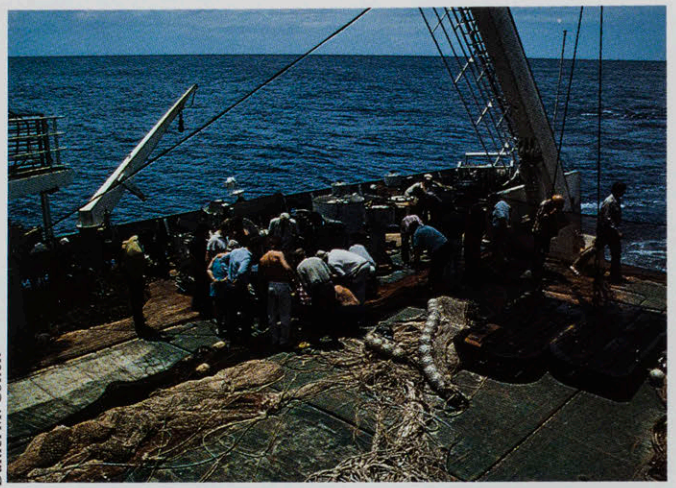

Daniel M. Cohen

There was always an eager crowd on the deck of the Research Vessel Vityaz *to search through each trawl haul, whatever the time or weather. Chief Curator Daniel M. Cohen recently participated in a scientific cruise aboard the flagship of the U.S.S.R. Academy of Sciences' Institute of Oceanology.*

days after leaving the preserve, Dr. Hogue came down with fever and other ailments that turned out to be those caused by a little-known pathogen called Mayaro virus (named from Mayaro County, Trinidad, where it was discovered in 1954). It is transmitted from jungle mammals to humans by *Haemagogus* and other kinds of mosquitoes.

Following negative blood tests from various laboratories, the Federal Center for Infectious Diseases in Fort Collins, Colorado, found a high titer of the antibodies to the Mayaro virus in Hogue's blood. Symptoms he experienced were fever, malaise, nausea, severe pains in the bones, joints, lower back and eyes, headache, and a skin rash similar to that accompanying measles infections. There is no specific treatment for the disease, which is so rare that its pathology and epidemiology are almost completely unknown, only a few outbreaks having been reported to date from the Caribbean and Amazon Basin. Dr. Hogue has now recovered except for residual soreness in some joints. He adds this case of unusual insect revenge to Colorado Tick fever, which he suffered in 1956 in northern California, and parasitism by a Human Bot Fly maggot in Costa Rica in 1971.

OUTREACH

Natural History Museum Announces Expansion of Lending Service Program. Seeking to reach a larger number of schoolchildren, the Museum plans to use most of its Lending Service collection of some 14,000 science specimens, cultural artifacts, and historical objects to expand its existing Classroom Collections Program, which is exclusively designed to serve schools.

The majority of the Lending Service collection will be divided into six to eight smaller "classroom collections" that will become part of the Classroom Collections Program, which the museum has operated for over 25 years. Some unique and unusual objects will remain in the Lending Service for museum members to borrow at nominal cost. These items will be available to members beginning in September 1989.

Explains Lending Service Coordinator Karen Himes, "Since 90 percent of our 500 Lending Service members were teachers, we felt we could better serve them by increasing the number of classroom collections available to Southern California schools."

For an annual fee of $600, the Classroom Collection Program allows each participating school or district to borrow one classroom collection of approximately 200 items for an academic year. Teachers will no longer have to visit the museum to check out objects from the Lending Service, but will be able to borrow from collections housed by their private or public schools or school districts.

To benefit schools in the museum's neighborhood, one classroom collection will be made available at no charge to the Exposition Park Area Education Consortium to be housed at a central location, where it will be available to local inner-city schools.

Himes says that the addition of the Lending Service collection will increase the Classroom Collection Program's size by 30 percent. She adds that because most of the Lending Service collection will now be housed by private and public schools and school districts, it will require less storage space within the museum and will free staff time for expanding teacher training programs.

Classroom collections are available for loan for nine months each year, from September through June. School and school district representatives interested in reserving collections for the 1989–90 school year should contact Karen Himes at 213/744-3345.

DEVELOPMENT NEWS

Bird Quest '89 Update. In January Dr. James Clements began a global journey to try to break the world record of 2,800 bird species seen in one year. He hopes to see 4,000 different species during 1989 and by so doing to help close the funding campaign for the Ralph W. Schreiber Hall of Birds. Dr. Clement says, "Our unique new hall will teach children and adults so many lessons about nature. The beauty and fragility of nature are truly messages from birds." Friends, birders, and supporters of the new hall are invited to pledge a gift to this exciting new exhibit. Pledges ranging from $.01 to $1 per bird sighted have been received and will be paid in December 1989, after Dr. Clement's final count is known. By March 15 $34,910 had been pledged (that's $8.73 per bird if Dr. Clements reaches his goal of 4000). Pledges will continue to be encouraged through December 1989.

Between January 1 and January 5 Dr. Clements counted 78 species in California. He then traveled to India, visiting three major geographical regions: the deserts of Rajasthan, the Wetlands, including Bharatpur, and the base of the Himalayas in Assam. In three weeks he saw 430 species, including a flock of Dalmatian Pelicans that descended at sunset in slow circles.

Dr. Clements continued his year-long odyssey by traveling to Cameroon in March. Cameroon lies across seven major vegetation belts, each with its own special bird species, and boasts almost 300 forest birds that do not occur in Kenya and 350 species that do not reach Senegal. Visiting each of the seven belts, he recorded a total of 450 species—slightly over 50 percent of the regularly occurring birds of the country; 130 of these species were purely West African specialties and 17 were Cameroon endemics that occur nowhere else.

Again in Cameroon, Dr. Clements became aware of the limited habitat still available to these bird species and other animals and plants. Forests are fragmented and under serious threat from fire, overgrazing by cattle, and woodcutting.

After a brief stop at home, where he birded Malibu and Newport Back Bay, he had sighted a total of 953 bird species by March 15. While in Ecuador he expects to add another 600 species.

The museum thanks the following contributors who

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C A Z
G A L L E R Y

Australian Aboriginal Art

Clifford Possum Japaljarri (Anmajera Tribe)
"Bush Possum Dreaming," acrylic on canvas, 47″ × 49″

The center circle groups are the Possum's tracks to and from the water.
Also depicted are his footprints and spinifex (type of tumbleweed).

One of the most significant artists to have emerged from the Papunya Tula Artists Association is Clifford Possum Japaljarri. His achievements have been acknowledged through exhibitions and inclusion in national and state collections throughout Australia and the World.

■

CAZ Gallery is proud to be a co-sponsor of
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■

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DREAMINGS

by PETER SUTTON

On a hot October day in 1977, some Aboriginal people were moving along the remote Kirke River in Cape York Peninsula, pointing out to me the locations and significance of the named places there. We were "mapping the country." As we rested in the shade by the lagoon called Waarang, an old man in our party, Jack Spear, had stripped and was bathing in the cool waters of his mother's clan country, speaking to its ancestral spirits and asking for their tolerance and protection.

Someone called out to a dog, using its Aboriginal name Yempunchelkanh (Heaps-up Grass). I asked Peter Peemuggina what this meant. He explained that the dog was owned by a man of Marsupial Mouse clan, and the dog's name was an oblique reference to this totemic Mouse and to the way it heaps up grass when making a nest. "Indeed," I said, "so what about your own dog?" "Oh, she is called Ngakkuyee'anh (Makes Ripples), because I am Shark."

This was systematic. Under local tradition all the dogs had names like this, based on the sacred emblems of their owners' landholding groups. The emblematic animals, plants, and other entities were the clan totems. Noticing my intense interest, Peter Peemuggina summarized, and with great feeling, in these words from his own language: "*Epama epam*!"—literally, "nothing is nothing."

A looser translation would be to say that everything has meaning. In a traditional Aboriginal sense, the world is made of signs. One may not know more than a fraction of their meanings, and not all their meanings are of equal significance, but the presumptive principle is that there is no alien world of mere things beyond the signing activity of sentient, intelligent beings. Idle doodling, or the making of meaningless marks, is alien. Galarrwuy Yunupingu, son of Arnhem Land artist Munggurrawuy has written:

> When I was 16 years old my father taught me to sing some of the songs that talk about the land.... One day, I went fishing with Dad. As I was walking along behind him I was dragging my spear on the beach which was leaving a long line behind me. He told me to stop doing that. He continued telling me that if I made a mark, or dig, with no reason at all, I've been hurting the bones of the traditional people of that land. We must only dig and make marks on the ground when we perform or gather food.

The meaningfulness of Aboriginal art to Aborigines has gradually been emerging from a long period in which it has largely been ignored by non-Aborigines, apart from a few anthropologists, collectors, and art curators. These meanings have thus far remained largely irrelevant to the appreciation of Aboriginal art works as objects of intense attention, as forms with high aesthetic potential. An acknowledgment that they mean something literal to Aborigines, rather than any particular grasp of the relation between that literal meaning and aesthetic experience, has tended to constitute the basis of a kind of distant respect for the content of the works.

While the literal meanings, the visual devices, the aesthetic potential, and the social-contextual significance of Aboriginal art may each be distinguished in theory, they all interact in practice to constitute the total meanings of the works for Aborigines. Those who seek an understanding of the art need to approach it on all these fronts.

The Dreaming and Aboriginal Religion

Most Aboriginal art, at least until comparatively recently, has been enmeshed in religious performance and the social networks and territorial groupings of its practitioners. The imagery of Aboriginal art, and that of the songs, dances, and ceremonial paraphernalia, is related both to the vast bodies of Aboriginal mythic narrative and to the wider symbolisms of daily life and belief. Together these symbolisms constitute a complex code of interaction that continually remodels, and at the same time reflects, Aboriginal cosmology, sociality, and notions of the person. Reproducing the culture, in this sense, is also in Aboriginal eyes reproducing or "following up" the Dreaming.

This is no mere blind adherence to custom. Careers are built, managed, and sometimes lost in the competitive activity that in part constitutes any Aboriginal artistic system. But Aborigines do not see the Dreaming as beyond or above the fundamental principles of personal autonomy, cooperation, competition, and conflict. Dreamings behaved just as human beings do.

Everything has meaning. In a traditional Aboriginal sense, the world is made of signs.

Ceremonial Ground at Kulkuta, *1981. Anatjari Jampijinpa (b. ca. 1929), Central Australia. Acrylic on canvas, 182.5 × 182 cm. Kulkuta is southwest of Sandy Blight Junction in Western Australia. It is a major water soakage and an important site for the Tingarri ceremonies. The painting depicts a ceremony at the site and the site itself. The larger circles are the older men, who are decorating the younger men, shown as smaller circles, for the ceremony. Photograph by Michal Kluvanek for South Australian Museum.*

Most Aboriginal art has been enmeshed in religious performance and the social networks and territorial groupings of its practitioners.

What Are Dreamings?

This is anthropologist W.E.H. Stanner's account of the efforts of an Aboriginal man to teach him the meaning of the concept usually referred to in English as the Dreaming, in its manifestation as a Dreaming Place:

> My father... said this: "My boy, look! Your Dreaming is there; it is a big thing; you never let it go [pass it by]; all Dreamings [totem entities] come from there." Does the white man now understand? The blackfellow, earnest, friendly, makes a last effort. "Old man, you listen! Something is there; we do not know what; *something*." There is a struggle to find words, and perhaps a lapse into English. "Like engine, like power, plenty of power, it does hard-work; it *pushes*."

Dreamings are Ancestral Beings. In that sense, they both come before, and continue to inhere in, the living generations. Their spirits are passed on to their descendants. Shark Dreaming, or Honey Ant, Yam, Cough, and the

Mimi Figures, *ca. 1965. Artist unknown, Western Arnhem Land. Ocher on bark, 72 × 32 cm. The Mimi are ancestral spirits; they are very thin and live in the cracks of rocks. While the images look static, they connote the energy and activeness appropriate to that being. Energy, in Aboriginal art, is not to be equated simply with depictions of movement. Images of aggressive, erotic, or disintegrative energy are very common. Photograph by Michal Kluvanek for South Australian Museum.*

Dreamings are Ancestral Beings. They both came before, and continue to inhere in, the living generations.

hundreds of other Dreamings known across Australia are part of the spiritual identities of those Aborigines who claim them as their Ancestral Beings or totems. Groups of people who share the same Dreamings may constitute totemic corporations, sets of people bonded by a common link to the spiritual. Particular Dreamings that function in this way as signs of groups, emblems of local and corporate identity, provide much of the spiritual underpinning of traditional communal title to land. To falsely claim the Dreaming of another group is a serious infringement of Aboriginal law.

In the myths, Dreamings are born, live, and sometimes die, but they are also eternally present. The spiritual dimension or domain in which they have their existence is the Dreaming, also sometimes referred to as the Dreamtime. Because it is foundational, the Dreaming is sometimes described as the beginning of the world. This was the period when the Ancestral Beings moved about, forming the landscape and creating the plants, animals, and peoples of the known world. They also founded the religious ceremonies, marriage rules, food taboos, and other laws of human society.

In that sense, the Dreaming is the Law. But in the Dreaming, Ancestral Beings frequently broke the Law, just as people do today. The Dreaming is thus the generative principle of the present, the logically prior dimension of the now, while also being a period in which the plants and animals were still women, men, and children, before their transformation into their present forms took place.

The concept of the Dreaming, the organizing logic of so much of the symbolism of Aboriginal art, is not easily explained partly because it is unlike the foundational concepts of most other religious systems. The Dreaming is not an idealized past. The Dreaming, and Dreaming Beings, are not the products of human dreams. In most Aboriginal languages the concept referred to in English as the Dreaming is not referred to by words for dreams or the act of dreaming, even though it may be through dreams that one sometimes gets in touch with the Dreaming. The use of the English word *Dreaming* is more a matter of analogy than of translation.

The animate beings of the Dreaming are not night visions, nor are they idealized persons. They are Ancestral Beings. They exhibit all the faces of human virtue, vice, pleasure, and suffering. Images of these beings, their places of travel and habitation and their experiences, make up the greatest single source of imagery in Aboriginal art. While most are characterized as the animals and plants of Australia (Kangaroo Dreaming, Cheeky Yam Dreaming, for example) or as heroic individuals (the Two Young Women, the Apalach Men), some are less readily grasped as totemic beings by outsiders (Cough Dreaming, for example, or Dead Body, Itchiness, and Diarrhea).

Aboriginal men making bark paintings (left, Taimundu; right, Papatama), Groote Eylandt, 1922. Photograph by N.B. Tindale, South Australian Museum.

In traditional Aboriginal thought, there is no central dichotomy of the spiritual and material, the sacred and secular, or the natural and supernatural. While each of the Dreaming Beings and their physical counterparts and manifestations (as animals, plants, water holes, rock formations, or people) are distinguishable, Dreamings and their visible transformations are also, at a certain level, one.

The centrality of place—particular lands and sites of significance—in this imagery enables even the religious sculptures to be regarded as "landscapes." For the tradition-minded, the art works themselves may belong on a continuum of manifestations of the Dreaming, together with the artists who made them, the natural species projected in the totemic designs, and the topographic features of the landscape. Landscape features themselves are the marks made by the Dreaming Beings, elements of a larger system of meaning. The single most common subject matter of Aboriginal art is landscape-based myth.

The Dreaming is not an idealized past. The Dreaming and Dreaming Beings are not the products of human dreams. They exhibit all the faces of human virtue, vice, pleasure, and suffering.

Tortoise, Honey, and Spikerush, *1952. Birrikitji Gumarna (ca. 1898–1982), North East Arnhem Land, Ocher on bark, 57 × 62 cm. This painting depicts the totemic lagoon of Freshwater Tortoise at Kulwitji. The dots and diamonds in the upper left panel represent drowned bees and honey, respectively, both of which floated to the surface of the lagoon after a hive was submerged there. The leaves of the spikerush growing in the lagoon are shown as diamonds at the upper right quadrant and upper half of the lower left quadrant. The six parallel lines in the bottom section of the lower left quadrant symbolize the fish trap constructed by the totemic hero Lanytjung. In the center of the lower right panel is a Freshwater Tortoise. The meanders represent its wake, and the diamonds and dots in the same panel are bubbles rising to the surface as the Tortoise feeds on the bottom. Photograph by Michal Kluvanek for South Australian Museum.*

The Younger and Older Apalach Brothers, *1962, Attributed to Uki Pamulkan (1912–1980), Western Cape York Peninsula. Left: wood, nails and ocher, 84.5 × 19.5 cm.; right: wood, nails, ocher, horsehair (?) and xanthorrhea (?) resin or beeswax, 118.5 × 40 cm. The two Apalach men, sometimes said to be brothers, traveled south from Love River to Kendall River, discovering the totemic centers, creating the clan estates and their clans, and bestowing various languages on the clans' members. They eventually fought and split up, one returning to the north, the other traveling further south. Apalach (Clear Water) refers to the settling of sediments in the sea at the end of the wet season, when it becomes easier to see and spear fish and rays. The sparkling of this clear water is marked by dots both on this sculpture and on the bodies of performers of the associated ceremony. The ceremony, and therefore the people from the area between Love River and the north side of the Kendall River, are also known as Apalach. Photograph by Michal Kluvanek for South Australian Museum.*

Landscape, Totems, and Symbolism

Aboriginal images of landscape, in the religious traditions at least, are not attempts to capture appealing views of nature. They are representations of instances of Dreamings. In Aboriginal terms, all landscape is someone's home. *Land, country, camp,* and *home* are encompassed by a single term in Aboriginal languages. The places represented in tradition-oriented Aboriginal art are usually the concentration points for intense religious, political, familial, and personal emotions.

Most works labeled "traditional," as well as the so-called transitional works such as Western Desert acrylic paintings on canvas and board, represent the places, events, and Dreaming characters of myths. These myths, in spite of their occasional cosmic overtones or their universal human psychological elements —such as the imagery of swallowing and disgorgement, or conflict and sexuality—are generally unintelligible to non-Aborigines.

Many Aboriginal myths are accounts of ancestors' travels from site to site, broken most frequently by incidents of hunting and gathering food, fighting enemies, and engaging in ceremonies with other characters of the "founding dramas." Few traditional Aboriginal myths actually consist of explanations of natural curiosities of the type made popular in collections of Aboriginal stories published for children. These are the "just-so" stories with invented titles such as "How the kookaburra got his laugh" or "How the porcupine got his quills." Aside from the "camp stories" told to

Dreamings

Australian Aborigines believe that the land, plants, animals, elements, and peoples of the known world were given their forms and meanings in the creative era, the period known as the Dreaming. The paintings and sculptures in **Dreamings: The Art of Aboriginal Australia** are expressions of the Dreaming, the central concept of Aboriginal religion.

The architects of Dreaming events were the Ancestral Beings, also known as the Dreamings. The Dreamings lived and acted like humans, but they also took the form of animals, plants, and the elements. Whether they are Shark Dreaming, Wild Yam Dreaming, Rain Dreaming, or many hundreds of others, their spirits are passed on to their Aboriginal descendants, who claim them as totems.

Dreamings: The Art of Aboriginal Australia, which appears at the Natural History Museum to August 5, consists of 103 paintings and sculptures from the Aboriginal societies that inhabit the sparsely populated heart of Australia, from the tropical forests of the north, through the vast deserts of the center, to the temperate south. It includes some of the first Aboriginal paintings collected by outsiders in the mid-nineteenth century as well as works created within the present decade.

Dreamings was organized by the Asia Society and the Southern Australia Museum, Adelaide. It was made possible by a major grant from the National Endowment for the Humanities. Additional support was provided by the Friends of the Asia Society Galleries, the Andrew W. Mellon Foundation, and Westpac Banking Corporation. Local support was provided by Westfield Inc./Westside Pavilion, Caz Gallery, AAM Inc., Vivitar, Ansett Airlines, and East-West Airlines.

Take the Pressure Down, *1987. Mitch Dunnet, Adelaide. Acrylic on canvas, 119 × 68 cm. Mitch Dunnet, an inmate of Adelaide Jail, painted this piece in 1987, the same year in which an Australian government Royal Commission was set up to inquire into the unusually large number of Aboriginal deaths in police custody—many of which involved suicide by hanging. Photograph by Michal Kluvanek for South Australian Museum.*

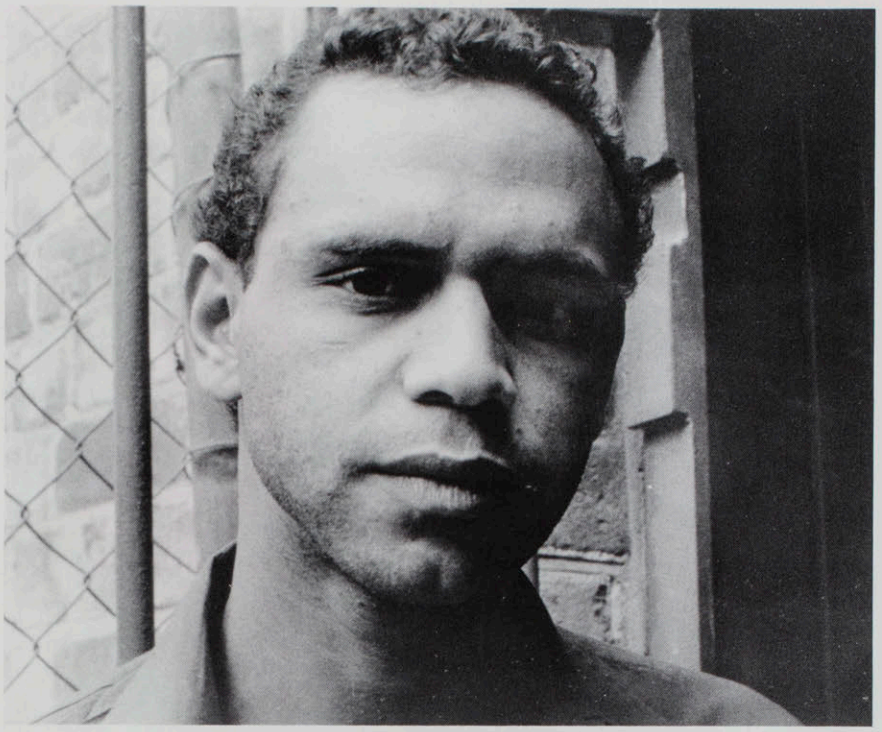
Few Aboriginal myths could be described as moral tales or fables. Explicit moral comment is rarely a feature of traditional Aboriginal narratives.

children, few of the myths could be described as moral tales or fables. The key characters of the more important myths are hardly models of approved behavior. Liberal misdemeanors by mythic ancestors are frequently unjustified and go unpunished, or if punished, then to an extent that often goes beyond any conceivable justice. Explicit moral comment is rarely a feature of traditional Aboriginal narratives, or even of historical reminiscences. Listeners must make their own judgments, if any.

Apart from any wider meanings they might have, many of the myths are centrally concerned with underpinning the rights of particular human groups to specific areas of land, and they often symbolize relationships of alliance or political disjunction between territorial groups, especially in the case of traveling myths. Even these myths to some extent lead a life of their own, not quite matching with current land tenure or the current state of intergroup politics.

In traditional Aboriginal thought, there is not nature without culture, just as there is no contrast either of domesticated landscape with wilderness or of interior scene with an expansive "outside" beyond four walls. In its focus on specific sites in the landscape, this type of art is centered on linked points marked by their social and religious significance in human affairs, not on their appearance alone. Their aesthetic is not a matter of "beauty," as such. Site-based, mythic representations in Aboriginal art are landscapes of landscapes, or conceptual maps of designs already wrought, not views of nature. As a Cape York man once said, "The land *is* a map!"

The Ancestral Beings, or Dreamings, who carved forms out of the formless world and molded the shapes of the creeks and desert sandhills and rainforests also brought human sociality and culture. Thus, there is no geography without meaning or without history. In the harsh desert of the Lake Eyre region, the concept of the Dreaming or ancestor is spoken of in English by local Aboriginal people as "History." The Ancestral Beings themselves are the "Histories," and the sacred sites are "History Places." In tropical Cape York Peninsula the same kind of Ancestral Beings are spoken of in English as "Stories," and their sacred dwelling places are "Story Places." The land is already a narrative—an artifact of intellect—before people represent it. There is no wilderness.



Aboriginal artist Mitch Dunnet, an inmate of Adelaide Jail. Photograph by Polly Sumner, 1987.

> ...most of the choir and furniture of heaven and earth are regarded by the Aborigines as a vast sign system. Anyone who, understandingly, has moved in the Australian bush with Aboriginal associates becomes aware of the fact. He moves, not in a landscape, but in a humanized realm saturated with significations. Here "something happened"; there "something portends."

Or, as Aboriginal people sometimes say of unexplained phenomena, "It must be *something*."

In this kind of tradition, the sculptures, paintings, dances, and songs that relate to the Dreaming are conceived as reproductions of works that have been created by conscious and spiritual beings. Any regularity in what a European might call "nature" will in most Aboriginal languages be referred to by the same term as that used for paintings, and in essentially the same way it seen as a sign of intent toward people, as a pattern of marks made by a conscious and social being, which is a Dreaming. Painted cross-hatching, dotting, or other such patterns are generally referred to by the same term as that used to describe the forms of honeycombs, reptile scales, spider webs, and similar patterned and symmetrical forms. Religious designs, and these other so-called natural designs, are all from the Dreaming. In fact, only

There is no geography without meaning or without history.

Australia

the Dreamings were original and creative; people simply copy. When a "new" sacred song or design originates with an individual, it is said to have been "found" by them, often in a dream or some other extraordinary experience. In the older, conservative Aboriginal tradition, human artistic creativity or originality is denied and, if attempted, disapproved of.

Style, and the reasons for making art, do change. Most "traditional" art of 1987 is distinct from, although very similar to, work from the same areas made forty years ago. And some neo-traditional work not only innovates with form, but it also innovates with regard to Aboriginal customary law.

The Aesthetic Locus of Aboriginal Art

Anthropologist Jacques Maquet suggests that each culture has a particular aesthetic locus, a center from which the aesthetic drive and criteria for artistic excellence radiate. While there may be continuity across all the things made in a society, the subject matter of the aesthetic locus is privileged. For sixteenth-century Japan, Maquet suggests that the center of this locus is the tea ceremony, from which criteria for quality in landscape gardening, architecture, interior decoration, ceramics, laquerwork, and textile design radiated. For thirteenth-century Europe, he suggests the "Christian cult" (buildings, statues, liturgical garments, ceremonial objects) as the aesthetic locus. For mid-twentieth-century North America, Western Europe, and Japan, "industrial design has become an important part of the aesthetic loci of the cultures of these areas."

The key locus of the Aboriginal aesthetic, in the classical tradition, is ceremony. This is an essentially social aesthetic, not one of alienation or of social rebellion or of largely private experience. It is very far from modernism.

What of more recent, urban Aboriginal art? That which is promoted and labeled as such is still very social in its approach, since much of it is about establishing, displaying, and arguing for "Aboriginality." A good deal of it is the art of identity assertion and of protest, not of ceremony, and it is therefore no less social in intent than an Arnhem Land clan design. Ray Meeks, the Sydney Aboriginal artist, writes:

> Aboriginal people have always had a vast, rich culture, and I am part of this. There are many things which are too numerous to mention about the treatment of Aboriginals. But through my art I have identity and strength. It would be true to say that I am hunting for lost pieces of myself, but through my culture I have many answers.

Urban Aborigines from southern and eastern Australia have been exposed for a much longer time to non-Aboriginal society and culture and have experienced much more profound cultural changes, yet they have not lost their sense of Aboriginal identity. More than a century of different experience separates urban Aboriginal life from that of people in some remote areas. In that period, Aboriginal material culture has gone from being a little-known facet of an exotic south seas group's obscure way of life to being seen, and to some extent known, around the world.

Peter Sutton is Head of the Division of Anthropology at the South Australian Museum, Adelaide. *This article is a shorter version of a chapter from the* Dreamings *catalog. It is reproduced with permission from The Asia Society Galleries and the South Australian Museum.* Dreamings: The Art of Aboriginal Australia *by Peter Sutton, published 1988. Copies of the catalog are available from the Natural History Museum's bookstore.*

Almost a Crab

by JOEL W. MARTIN

I've got one." The call came from the far side of the stream—just that short sentence and no more, not even the perfunctory exclamation point to indicate that what was "got" was of any importance. And yet my skin tingled as if I had just been informed of the discovery of a living trilobite. At the time that the voice filtered down to me through a completely foreign vegetation, I was knee-deep in cold water in the Arroyo San Antonio in southern Uruguay. Wading upstream, I approached my friend with some uncertainty. After all, the animal we were seeking had not been reported from this part of the world for nearly half a century. My doubt was unjustified, and I now feel guilt when I remember my lack of faith; Dr. Bruce Means, probably the finest naturalist I shall ever know, has a reputation of sorts and (I was to find out later) makes few if any mistakes in the field. When I reached him, any questions I might have had were immediately answered. He held in his hands a living specimen of a bizarre freshwater "crab." Not a true crab (that is, a member of the infraorder Brachyura) or a crayfish (a member of the infraorder Astacidea), the animal in Bruce's hand was a member of the endemic South American crab genus *Aegla*.

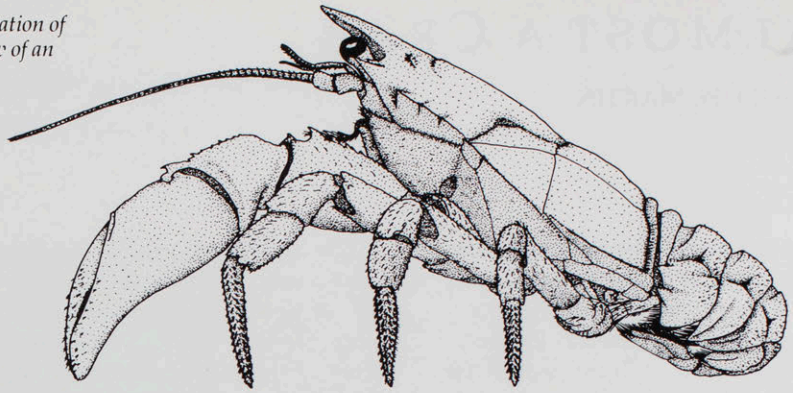
Decapod (ten-footed) crustaceans—the group of invertebrates that includes the familiar crabs, shrimps, and lobsters—are among the largest of the invertebrates. A brief perusal of the group usually leaves one staggered at the diversity of sizes and shapes. Decapods range in size from symbiotic pontiniid shrimp only a few millimeters in length to Japanese spider crabs with a leg span of several meters. In shape they may be of unbelievable delicacy and fragility, as are some of the resplendent cleaner shrimps, or they may be as massive as that culinary delight, the Maine lobster, known to exceed sixty pounds in very old individuals.

The diversity is itself somewhat misleading. All decapods, regardless of size or shape, are basically very similar. All possess eight pairs of thoracic appendages; the first three pairs are modified as feeding structures, which leaves five pairs for ambulation (hence the name Decapoda). Often the first of these five pairs are modified into large claw-bearing appendages, leaving only four pairs of walking legs. Every species possesses a large carapace, shielding the back of the fused head-thorax region, and each has an abdomen of six segments, although it may be modified from group to group. It is a simple mental exercise to envision the elongate tail of the primitive forms, such as the commercially harvested penaeid shrimps, becoming heavier and more massive with a corresponding flattening and thickening of the carapace. The result is a lobster; indeed there are few differences between "shrimps" and "lobsters" other than the number of legs that terminate in claws and the mode of reproduction (the commercial shrimps shed their unhatched eggs into the sea, whereas all other decapods carry the eggs through hatching). Continuing the exercise, one can see that a crab is built along the same plan, but with the abdomen reduced and tucked away beneath the thorax and with the carapace greatly widened.

This unity of form serves to unite the decapods into a natural, clearly defined taxon. The basic architectural design can be followed without interruption as one proceeds from group to group. But this same cohesiveness makes the job of the taxonomist devilishly hard. How does one divide the decapods into subgroups? A crab is a crab, and a shrimp a shrimp, but in reality the boundaries of "crabdom" are poorly delimited, and there are many groups that seem to fall somewhere in between.

A large male aeglid, a freshwater relative of the hermit crab, from the Arroyo San Antonio, southern Uruguay. This specimen is the largest Aegla *known to science. Photograph by Joel W. Martin.*

Early naturalists divided the decapods into three somewhat artificial groups, based upon the relative development of the abdomen. The macrurans (longtails) encompassed all of the shrimps and lobsters. The brachyurans (shorttails) contained the true crabs; this assemblage is believed to be a natural (monophyletic) group, and we have retained Brachyura as a widely recognized taxon. But there remained a large number of decapods that fit into neither of these two groups. The tail was either asymmetrically twisted (the hermit crabs and their relatives) or flexed forward beneath the abdomen like that of a crab, but not as reduced. Examples of this latter group are the familiar mole crabs or sand fleas (*Emerita* and *Hippa*) of Atlantic and Pacific coasts of North America and a marine benthic (deep water) taxon, the Galatheoidea. The appropriate name Anomura was assigned, on the basis of the

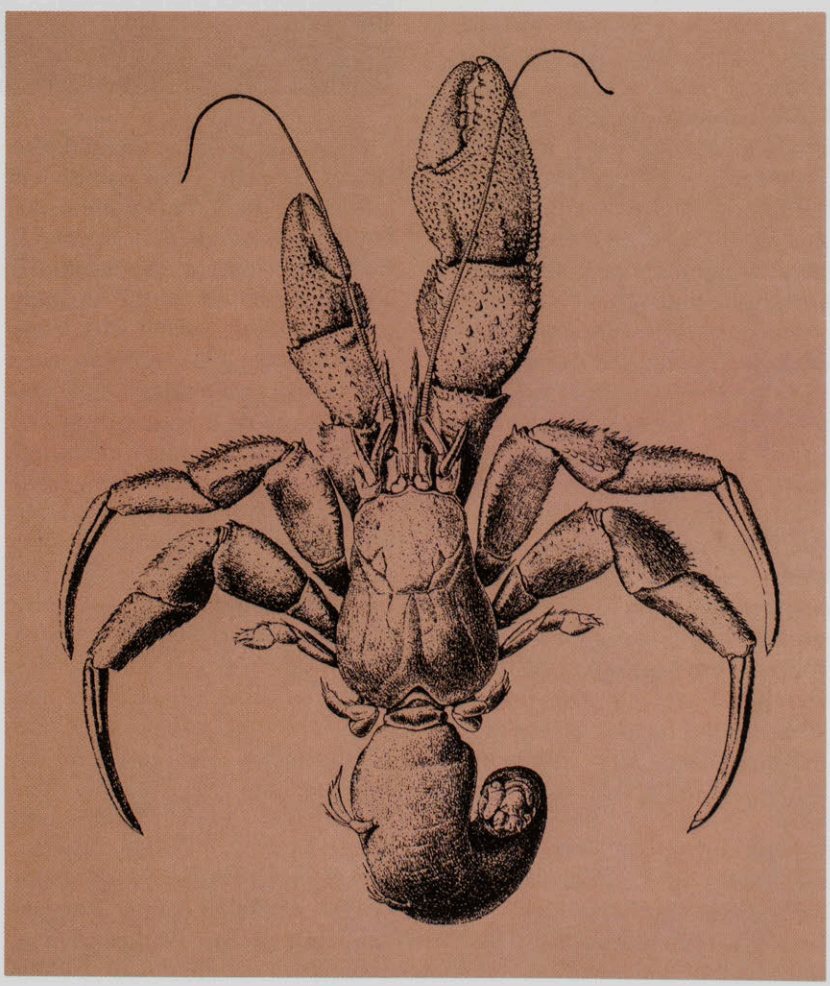


An illustration of a side view of an aeglid.

anomalous nature of the abdomen, to members of this nonconformant assemblage. It is to this group, the Anomura, that the South American aeglids belong.

I began studying aeglids long before I had the opportunity to see my first specimen. That specimen, a small crab on loan from the Smithsonian Institution, had been preserved for over fifty years. Yet they are not rare. During the few weeks we were to spend in Uruguay, Bruce Means and I would collect several hundred specimens, returning many living specimens to our Florida State University laboratories. In fact the family is fairly well represented in most of temperate South America; the absence of reported sightings in Uruguay stems probably from inadequate sampling. So why are aeglids of interest? There are two reasons. First, like so many zoological enigmas, they may not be what they appear to be. Second, their habitat is undergoing drastic reduction and perturbation; natural freshwater habitat in Uruguay is increasingly difficult to find.

Aeglid crabs traditionally are grouped with a marine superorder of decapods, the Galatheoidea, an assemblage that contains galatheid crabs (often called "squat lobsters"), porcelain crabs, and rare deep-sea chirostylids, which tend to associate with gorgonian sea fans. Superficially, aeglids resemble the squat lobsters of the family Galatheidae, but this entire assemblage, except the aeglids, consists of species restricted to a marine environment. Aeglids are strictly freshwater animals. They need never return to the sea, not even to deposit eggs as do many freshwater or terrestrial crabs and shrimps, but instead undergo direct development (there is no larval stage) in fresh water. In addition to this ecological difference, there exist in *Aegla* a host of morphological peculiarities found in no galatheid. The connection between aeglids and their supposed marine relatives appears tenuous at best. Are there any more likely candidates for aeglid relatives?



Aegla *is an anomuran crab like the hermit crab* Pagurus alaskensis. *If* Aegla *is closely related to hermit crabs, then the evolutionary divergence must have occurred before hermits became asymmetrically coiled for life in snail shells.*

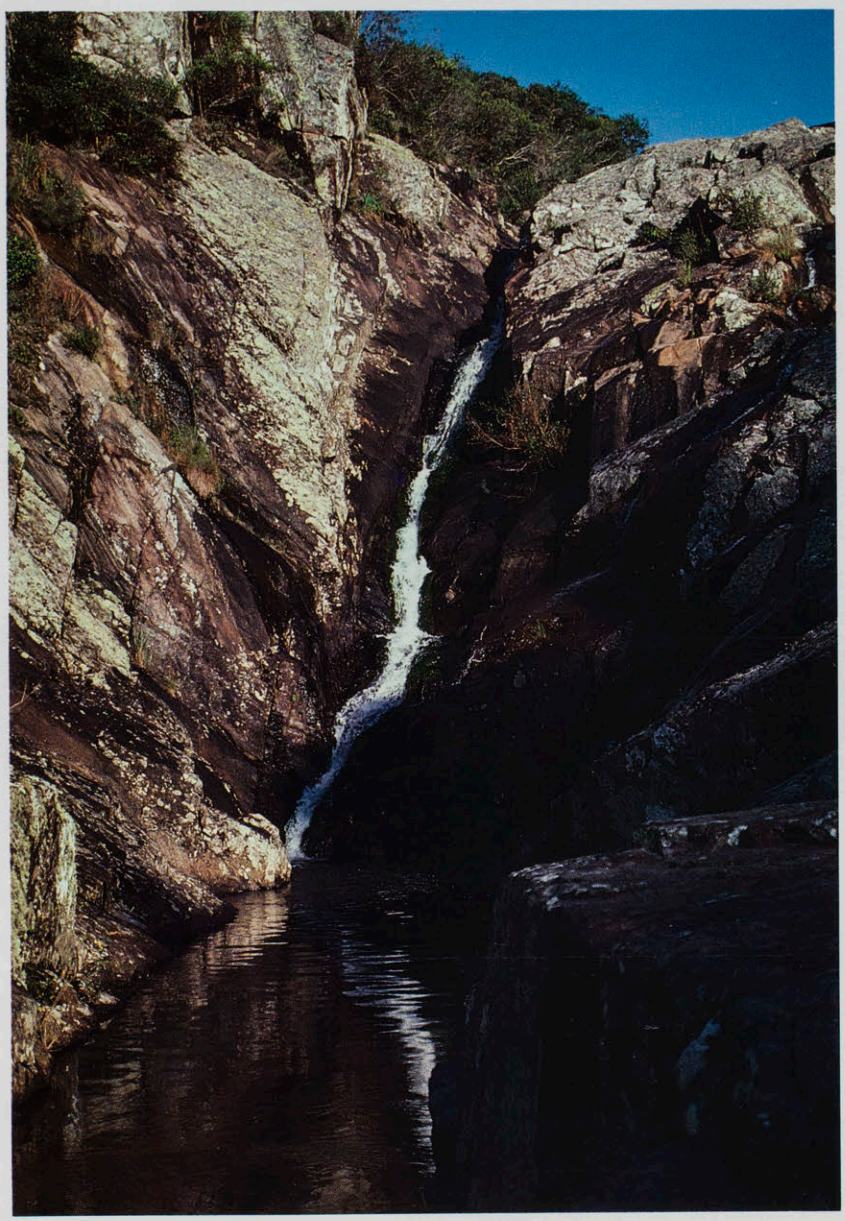
As I stared in amazement at the crustacean in my friend's hand, I began comparing the crab to all other decapods with which I was familiar. The flat, cockroachlike appearance and the slow forward crawl of the crab were not remniscent of any of their supposed relatives in the Galatheoidea. Over the next few weeks we were to make many observations on aeglids in their natural environment (cold rocky streams); each encounter further convinced me that aeglids were very different from any of the squat lobster group. The most striking feature of the aeglids is the carapace. It is oval and flat, with serrated margins. This combination of features is not unique—indeed it is not too different from that seen in several squat lobsters—but the carapace is crossed by a series of thin lines, effectively dividing the carapace into distinct regions. Preserved specimens can be teased apart along these sutures. It is a condition shared by no member of the galatheoidea. However, one other group of decapods does have a similarly divided carapace.

A map of Uruguay showing localities where the author found aeglids.

Along the shores of almost all continents swarm legions of hermit crabs. These ubiquitous decapods walk in a more or less forward direction, as do the aeglids. Their right and left claws are almost always asymmetrical, like those of the aeglids. The carapace is subdivided by a series of suture lines nearly identical to that seen in *Aegla*. In fact, it seems possible that aeglids represent a freshwater offshoot of the hermit crabs that branched off long before asymmetry (as an adaptation to living in snail shells) proved to be the predominant hermit theme.

The surrounding countryside should have been my first clue to this surprising possibility. Uruguay is a flattened speck of delta; the highest elevation in the country is less than fifteen hundred feet. Over the past millennia the adjacent Rio de la Plata has leveled the lowlands of Uruguay and eastern Argentina into a gently rolling, incredibly rich landscape. Indeed, over evolutionary time and considering the large number of marine inundations, the vast expanse of the Argentine and Uruguayan flatlands could be considered one large estuarine mud flat—a not surprising habitat in which to find hermit crabs. Marine waters have spread across Uruguay and eastern Argentina numerous times in the past. Epicontinental seas persisted over the Amazon and Rio de la Plata basins well into the late Cretaceous (some 65 million years ago), the time period that contains the only known fossil aeglid. That fossil, from marine deposits in New Zealand, allows us to postulate the approximate time at which aeglids may have been stranded in freshwater in South America. As the seas receded, numerous organisms were undoubtedly left behind in pools of brackish water. Although the majority probably did not survive, those hardy enough to adapt to brackish and eventually fresh waters have persisted until today. Thus the aeglids, long thought to be relatives of the marine squat lobsters, may instead have descended from shell-less hermit crabs left behind when the seas receded from the Argentine pampas.

Joel W. Martin, Assistant Curator of Invertebrates at the Natural History Museum of Los Angeles County and an Adjunct Assistant Professor of Biology at the University of Southern California, joined the museum staff in April 1988. His research interests focus on the morphology, relationships, and evolution of marine and freshwater crustaceans. His field work in South America was made possible by a grant from the National Science Foundation.



Aeglid habitat. Salto de Penitente (the falls of the Penitente River), southern Uruguay. This area is one of the highest points in the country. Photograph by Joel W. Martin.

California's Vanishing Wildlife

California Nature Conservancy Exhibit Highlights Endangered Species

Photographs by

SUSAN MIDDLETON

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California Clapper Rail
Rallus longirostris obsoletus
This inhabitant of the coastal marshes of San Francisco Bay and central California builds an elaborate nest that looks like a miniature lifeguard stand. All three subspecies of the Clapper Rail in California are endangered; there are fewer than 170 pairs of the Light-footed Clapper rail, which ranges from San Diego to Yuma Beach. Destruction of marsh habitat has reduced all populations. The Clapper Rail's continued existence is entirely dependent on protecting and expanding marsh remnants.

California's biological diversity is staggering; there are more native plant and animal species in California than the entire central and northeastern United States and Canada combined. This great diversity is increasingly threatened by disturbances of natural habitats for human needs. The photographs in **California's Vanishing Wildlife,** taken by San Francisco photographer Susan Middleton and commissioned by the California Nature Conservancy, serve as guides to greater knowledge of the complexity and fragility of California's natural heritage. (The exhibit, is sponsored by Coast Savings and *California* Magazine, on view in the museum's foyer from June 24 to September 17.)

Natural Diversity: Facts that Influence Our Future

For many of us the natural world offers more than tangible benefits; California's unique landscapes, home to so many plants and animals, provide us with increasingly necessary relief from developed environments. They give us balance, perspective, and an irreplaceable sense of freedom and tranquility.

In thousands of invisible ways, our physical health is also inextricably bound to the health of the living systems that remain.

Half of all medicines come from natural sources.
In California, the seeds of the Humboldt milkvetch, a plant presumed extinct until its rediscovery in 1987, are being tested for use in chemotherapy treatments for cancer. Another native, the endangered Antioch Dunes Evening Primrose, produces compounds that researchers hope will help heart disease victims.

All crops rely on fresh genes from the natural world to resist disease.
The corn blight that killed crops in the early 1970s cost consumers over $2 billion before a blight-resistant strain from a wild grain came to the rescue.

Our quality of life depends upon natural diversity.
Such critical "ecological services" as pollution control, watershed protection, and maintaining a natural balance of insects that damage crops are accomplished every day by the world's natural support systems.

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California Desert Tortoise
Gopherus agassizii
The state's only tortoise has long resided in the deserts of southern California. It is fully protected by the California Fish and Game Commission as a threatened species, but a recent move to declare the reptile (State Reptile since 1972) endangered was recently postponed. While the desert tortoise is long lived, it takes more than a decade to reach sexual maturity and reproduction rates are low. A tortoise hatched today could well live in the wild to the year 2050—if any habitat remains for it.

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Bakersfield Cactus
Opuntia basilaris var. *treleasi*
This beautiful cactus grows in the sandy soils and old river cobble near Bakersfield and is one of the top ten endangered plants in California. Less than one percent of the population remains due to habitat loss and it remains in isolated pockets; residential development and sand and gravel removal continue to take many colonies each year. The survival of the Bakersfield cactus is in doubt unless existing populations can be protected.

THE JOHN JAGO TRELAWNEY GEM COLLECTION

by ANTHONY R. KAMPF

Important museum collections are rarely the result of gradual piece-by-piece growth. Almost invariably they owe their significance to *infrequent* donations of fine private collections. This is particularly true of museum gem collections because of the high cost of gems and the scarcity of acquisition funds available to natural history museums. Our museum's gem collection is quite young yet, because of several such donations, it has risen rapidly to a place of prominence among the finest museum collections in the Western Hemisphere.

Although many generous individuals have contributed to the growth of the museum's gem collection, three donors deserve special recognition because of the size and significance of the collections which they contributed. The late Mr. William E. Phillips, a well-known Los Angeles jeweler, laid the groundwork for the collection through a series of gifts of fine gemstones between 1953 and 1961. The second major collection was given by the late Colonel Frederick C. Hixon of San Antonio, Texas. His remarkable collection of "colored gemstones" (gems other than diamond) arrived in several parts between 1972 and 1978 and was described in TERRA, Vol. 16, No. 4 (1978). The most recent major collection to be added was received on December 7, 1988 from Mr. John Jago Trelawney of Palo Alto, who made the donation in memory of his mother, Harriet Jago. His 181-piece collection, valued at more than half a million dollars, is the largest noncash donation received by the museum since the arrival of the Hixon Collection more than ten years ago.

John Jago Trelawney

John Jago Trelawney was born John Trelawney Jago in Italy on April 1, 1909. His mother was American and his father Italian and English. For most of his life he preferred to be known to his friends as Jack Jago, and it is by this name that he is still best known in mineral collecting circles; but in 1972 he legally changed his name, transposing Trelawney and Jago. This is actually in accord with nineteenth-century usage in his father's family which can be traced to Penzance in Cornwall and to a marriage between the Jago and Trelawney families.

He moved to California in 1915 and shortly thereafter he was first exposed to mineral collecting when he received a set of minerals assembled by the well-known Palo Alto mineral dealer R.M. Wilke. In 1933 Mr. Trelawney graduated from Stanford University with a degree in law. His specialty in maritime law subsequently took him to a variety of places around the country and the world, but allowed little time to devote to his childhood interest in minerals. It wasn't until the late 1940s that he was able to seriously pursue that interest. For the next 15 years he collected minerals with an intensity and perception for quality and esthetics that few could match. By 1964 he had amassed one of the finest private mineral collections in the country. In that year he reached a donation agreement with the Smithsonian Institution whereby his collection was transferred to them. Since 1964 he has continued to collect minerals, though at a significantly lesser pace.

John Jago Trelawney only began collecting gems seriously in 1977, but he pursued that interest with the same intensity and awareness for quality and esthetics that had marked his earlier mineral collecting endeavors. Add to these traits his already well-developed contacts in the gem and mineral marketplace and one begins to understand how one man was able to amass a gem collection of considerable significance in the short span of 11 years.

The Trelawney Collection

The Trelawney Collection, like that of Colonel Hixon, is essentially a collection of "colored gemstones" (it does contain one diamond). In assembling the collection, Mr. Trelawney seems to have employed much the same criteria as did Colonel Hixon. Both collectors firmly believed quality and variety to be more important than size. Not surprisingly, both collections contain many of the same gem species and both are rich in gems from Sri Lanka and the Brazilian state of Minas Gerais, traditionally the two most important colored gemstone mining regions. However, in spite of the many similarities between the two collections, there is little redundancy. The great diversity in colored gemstones, even within the same gem species, and subtle but perceptible differences in personal taste have collaborated to give the two collections distinct personalities. But perhaps the most important factor that sets them apart is the time frame in which they were assembled. More than any period in recent history, the last decade has seen a dramatic change in the world of colored gemstones. This is because of the emergence of

John Jago Trelawney

Don Meyer

East Africa as an important gem mining region. The Trelawney Collection contains fine examples from many of the new gem localities in East Africa, that have only become productive during this period. Thus the Trelawney and Hixon collections complement one another amazingly well, with the Trelawney Collection adding wonderful new depth and scope to the museum's collection.

Considering the large number of important gemstones of all kinds in the Trelawney Collection, it would be impossible to list all of the best here. Nevertheless, several deserve special mention, especially with respect to their impact on the museum's collection.

Tourmaline

Before the addition of the Trelawney Collection, the museum could already boast a fine assortment of tourmaline gems. Nevertheless, the spectacular quality and diversity of the tourmalines in the Trelawney Collection, a reflection of Mr. Trelawney's obvious attraction to this gem group, add a marvelous new dimension to the museum's collection.

The collection includes several deep red rubellite tourmalines from the Ouro Fino mine in Minas Gerais, Brazil, the best of which weighs 20.22 carats. Rubellites from this mine, which was discovered in late 1979, have become the standard by which all others are measured.

Though the hot pink tourmalines found at the Stewart mine near Pala, California, are often heavily flawed, they are regarded by some as the best in the world. A 62.99-carat Stewart tourmaline of excellent clarity in the Trelawney Collection now ranks as the best such stone in the museum's collection.

In recent years Tanzania has produced some of the loveliest of green tourmalines. The intense color of these stones is attributed to trace amounts of chromium, leading to their being called chrome tourmaline. The Trelawney Collection has two fine examples weighing 22.69 carats and 11.32 carats.

Another favorite of tourmaline lovers is the indicolite. Ideally this tourmaline gem should display a pure deep blue color, although most stones on the market exhibit distinct green overtones. A 21.63-carat indicolite from Minas Gerais, Brazil, in the Trelawney Collection closely approaches a perfect blue.

Topaz

The museum was noticeably weak in the most sought after of topazes, the orange to orange-red stones often referred to as imperial topaz. It may seem surprising that the orange color most often associated with topaz is in fact one of the least common of its colors—colorless and blue topaz are far more common, and many orange stones referred to by such names as "oriental topaz" are actually the citrine variety of quartz. Essentially all of the world's imperial topaz comes from the area surrounding Ouro Preto in Minas Gerais, Brazil, and the Trelawney Collection adds several significant imperial topaz gems from this area to the museum's collection. The best is a 30.03-carat gem with an intense reddish overtone.

Topaz gems of a pure pink color are even rarer than imperial topaz, and they are found almost exclusively at a small deposit in Pakistan. One excellent pink topaz weighing 10.15 carats is included in the collection.

Garnet

As strong as the Hixon Collection is in most of the major colored gemstone groups, it is rather weak in its garnet representation. This deficiency became more obvious with the recent discovery in East Africa of two new garnet varieties, tsavorite and Malaya garnet. The acquisition of the Trelawney Collection has drastically improved the museum's suite of garnets. Of those added the three most significant are all from East Africa. They are a 42.33-carat malaya garnet of fine red-orange color from Tanzania, a 9.73-carat tsavorite of rich green color from Tanzania, and a deep purplish-red 34.15-carat rhodolite garnet from Kenya. Rarer than these, but of interest only to the collector, is a 5.20-

carat colorless grossular garnet from Kenya.

Among the garnets from other parts of the world is a bright orange spessartine weighing 6.08 carats from Ramona, California. However, since his initial donation, Mr. Trelawney has purchased for the museum a remarkable spessartine from this locality weighing 16.68 carats.

Opal

The most commonly encountered precious opals are those with flashes of color against an opaque black or white background. These are essentially the only opals available on the retail gem market and virtually all come from the prolific deposits in Australia. Yet the type of opal that many regard as the most beautiful of all comes principally from the Queretaro deposit in Mexico. The opal is water clear with floating flashes of brilliant red, green, and blue color. The Trelawney collection includes three large and beautiful examples: a 62.89-carat stone with a pale orange body color exhibits broad and vivid flashes of red, yellow, and green. Another weighing 36.51 carats has a light beige body color and red, yellow, green, and blue color flashes. A colorless Mexican opal weighing 48.15 carats is enlivened by floating flashes of spectacular blue and green color.

Beryl

Probably the most valuable gem in the Trelawney Collection is a fine 7.86-carat emerald from Muzo, Colombia. However, of greater gemological significance are examples of some of the lesser known beryls, the most impressive being a 45.30-carat morganite from Madagascar with a bright pink color that must be seen to be believed.

Sapphire and Ruby

Sapphire and ruby are varieties of the same mineral, corundum. Perhaps the single most important group of gems in the Hixon Collection is the sapphire suite. The almost incredible spectrum of colors exhibited by the Hixon sapphires quickly puts to rest the commonly held misconception that all sapphires are blue. Overall the sapphire representation in the Trelawney Collection is not as comprehensive as that assembled by Colonel Hixon. Taken individually, however, several Trelawney stones are superior to corresponding Hixon stones and the Trelawney Collection adds several stones with color hues not already represented in the museum's collection. Mr. Trelawney considers a 9.83-carat deep pink (fuchsia) sapphire from Sri Lanka to be his best, and I have no doubt that he is right. Nevertheless, my own favorite is a 40.09-carat yellow stone of striking brilliance from the same country.

Most of the sapphire gems that find their way into jewelry have been artificially treated to change or improve their color and/or clarity. A Sri Lankan golden sapphire in the collection, though it weighs only 5.87 carats, is significant because it is an untreated stone.

Two fine rubies are contained in the Trelawney Collection. The best is a very bright red stone of 3.03 carats from Thailand.

Spinel

Spinel is, in a sense, the poor cousin of sapphire and ruby. This usually underrated and underappreciated gem is often found in the same deposits as sapphire. It is about as rare as sapphire and ruby, similar in appearance when cut, and only a bit softer; nevertheless, it has never attained the status of sapphire and ruby.

Some of the world's most famous rubies, such as the Black Prince's Ruby in the British crown jewels, have actually been red spinels. There are two particularly fine examples of red spinel in the Trelawney Collection. A 12.76-carat stone from Sri Lanka is notable for its size and a 4.54-carat Burmese stone for its intense bright red color. The collection also contains a grey-blue spinel, also from Burma, which at 25.33 carats may be the largest fine spinel of this color known.

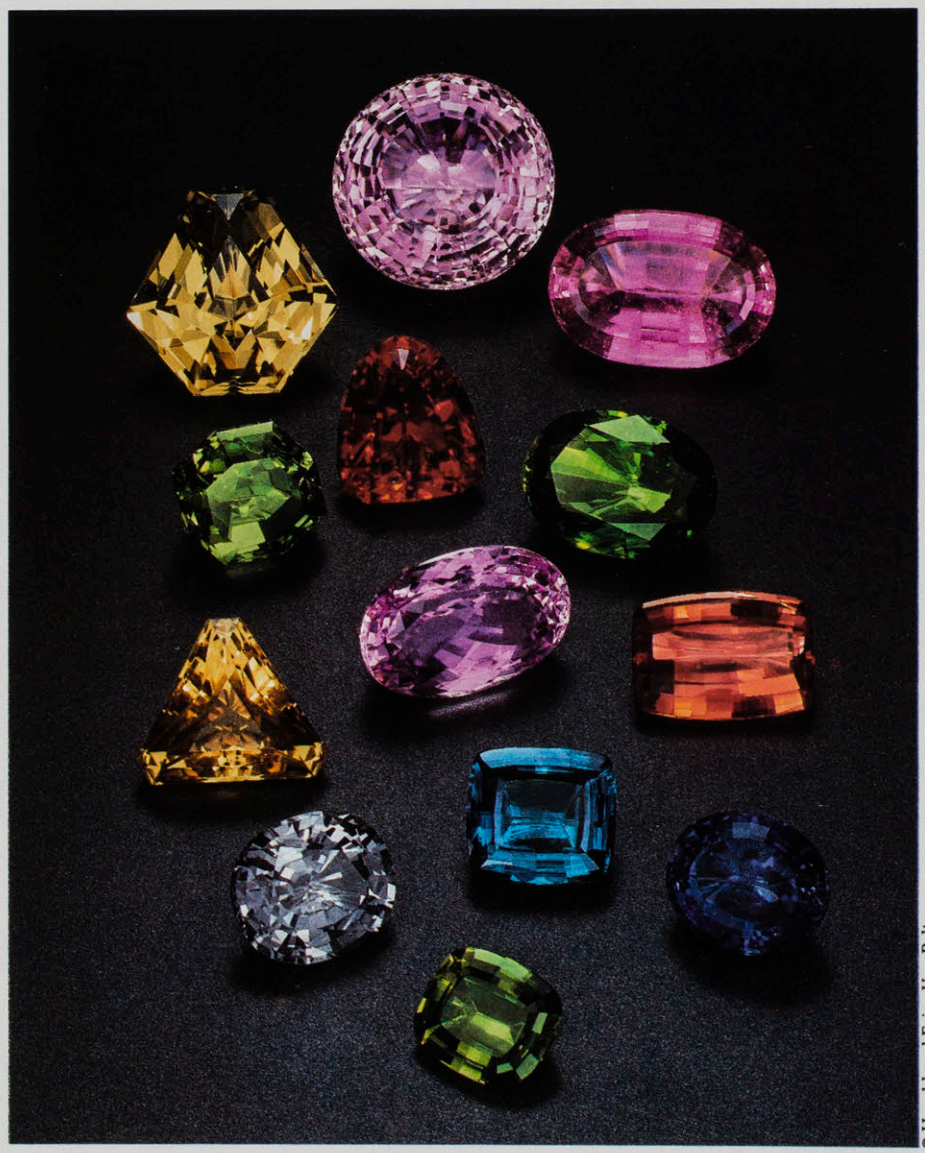
Zircon

Colorless zircon has been employed as a substitute for diamond, but, like sapphire, zircon can come in almost any color. Several beautiful examples of this gem can be found in the Trelawney Collection. The best is a 31.30-carat bright yellow stone from Sri Lanka.

Peridot

William E. Phillips donated the finest peridot in the museum's collection, a 122.55-carat deep green stone from St. John's Island in the Red Sea. The Trelawney Collection adds two fine examples of peridot from other important deposits, a 45.08-carat dark green stone from Burma and a 13.94-carat bright lime green stone from Norway. The latter is one of the largest fine peridot gems known from this locality.

A selection of some of the finer gemstones in the Trelawney Collection, listed by row from left to right. Row 1 (top): yellow chrysoberyl (79.85 cts.) from Brazil, kunzite (121.62 cts.) from Brazil, pink tourmaline (62.99 cts.) from California. Row 2: green fluorite (39.49 cts.) from Colombia, malaya garnet (42.33 cts.) from Tanzania, peridot (45.08 cts.) from Burma. Row 3: yellow scapolite (27.03 cts.) from Kenya, morganite (45.30 cts.) from Madagascar, imperial topaz (30.03 cts.) from Brazil. Row 4: grey-blue spinel (25.33 cts.) from Burma, indicolite (21.63 cts.) from Brazil, tanzanite (28.41 cts.) from Tanzania. Bottom: chrome tourmaline (11.32 cts.) from East Africa.



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Collector gems

Many gems are too rare to be marketed commercially or lack the durability necessary for use in jewelry. These gems are usually of interest only to collectors. John Jago Trelawney's highly refined appreciation for the rare and unusual is reflected in the representation of such gems in his collection. If I had to pick a single favorite in the entire Trelawney Collection, it would be a superb 28.41-carat blue-violet tanzanite from Tanzania. Surprisingly, prior to this donation, the museum had no faceted tanzanite gems in its collection.

Although several fine chrysoberyl gems are included in the collection, a 79.85 carat green-yellow stone from Brazil is remarkably large and fine for the species. A 9.07 carat chrysoberyl from Sri Lanka, though much smaller, is notable for its distinct green color.

An oval-cut yellow euclase from Minas Gerais, Brazil exhibits excellent brilliance for the species and at 63.84 carats, it ranks as one of the largest known. A much smaller euclase from the same area weighs only 5.94 carats, but it possesses a rare and beautiful green-blue color.

Beryllonite gems, though colorless and with little dispersion, are exceedingly rare. A fine 16.20-carat beryllonite gem from Brazil in the Trelawney Collection rates as the second largest of its kind in the world.

Benitoite, a gem that combines the beautiful color of blue sapphire and the striking dispersion of diamond, is represented in the Trelawney collection by a fine 2.90-carat stone. Benitoite is recognized as the official state gemstone of California, and it is found only at one place in the world, a small deposit in San Benito County.

Some other collector gems worthy of special note are a 16.50-carat violet-brown axinite from Mexico, a 27.03-carat yellow scapolite from Kenya, a 39.49-carat emerald green fluorite from Colombia, a 19.62-carat green kornerupine from Madagascar, and a 17.17-carat brown cassiterite from Bolivia.

One hundred of the finest Trelawney gemstones are already on display in the museum's Hall of Gems and Minerals, and Mr. Trelawney has promised to add to the collection in the coming years. With the acquisition of the Trelawney Collection, the museum's gem collection has attained a maturity and stature that belie its youth.

Dr. Anthony R. Kampf is the Natural History Museum's Curator of Mineralogy. Many of the gems described in the article are on display in the museum's Mineral and Gem Hall.

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Changing Views of Evolutionary History

by LOWELL DINGUS, EUGENE S. GAFFNEY, and J. WILLARD WHITSON

The fossils from China displayed in the **From the Land of Dragons** exhibition are not all dinosaurs. They represent a sample of the dazzling variety of animals that have inhabited the earth over the last 300 million years. Our views concerning the evolutionary relationships of some of these groups have changed drastically in the last decade, largely as a result of changes in the way scientists are reconstructing evolutionary history.

One of the most important properties of life is its overwhelming diversity, and one of the most important pursuits of science is to study this diversity by comparing and contrasting the characteristics seen in different animals and plants. This study is called *systematics* or *comparative biology,* and it forms the basis for reconstructing evolutionary history.

Over the last two decades, many scientists have employed a new, more rigorous approach for placing animals into groups based upon the uniquely evolved characteristics that they are thought to share. The technique is called *cladistics,* and it seeks to arrange animals into groups, called *clades,* which, simply, contain the first member of the group and *all* its later descendants. This is like your family tree, which contains your grandfather and all the descendants that resulted from his marriage to your grandmother. Although contradictory results are sometimes obtained, the basic approach is simple, as shown by the example in the following section.

Reconstructing the Evolution of Vertebrates

We see a pattern in the diversity of life when we look for characteristics that are shared by different organisms. This pattern of characteristics can be used to arrange organisms into large groups that in turn contain smaller groups.

This arrangement of groups within groups results when evolving descendants inherit modified or *derived characteristics* from their ancestors. By studying the distribution of these derived characteristics among different animals, we can determine the order in which they evolved and thereby interpret the sequence of evolutionary history.

Branching diagrams called *cladograms* are used to show the sequence of evolution. By starting at the bottom and reading up branch by branch, we can reconsruct the order in which new characteristics evolved.

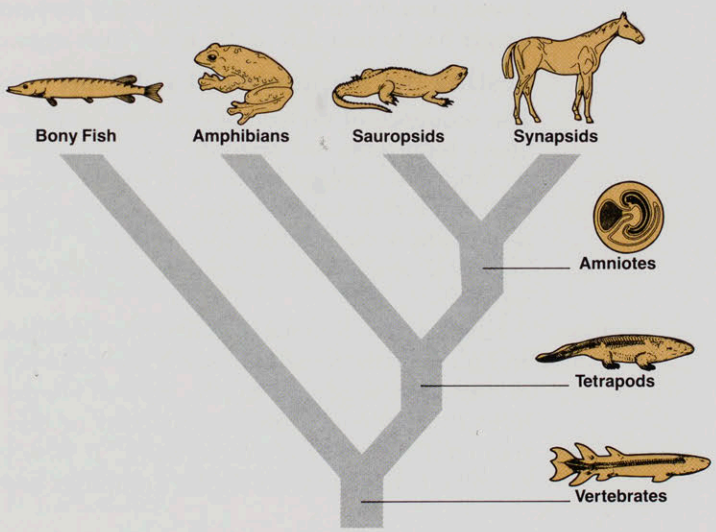
Each newly derived characteristic distinguishes a clade, which contains all the descendants on higher or succeeding branches. The sequence of derived characteristics thus defines a pattern of groups within groups.

For example, some characteristics are shared by a large number of animals. Bony fish, frogs, lizards, and horses all have a backbone composed of small individual bones called *vertebrae.* Thus, they are all included in the group called *vertebrates.* We infer that all vertebrates arose from the first animal that had a backbone, and this first vertebrate is called the *common ancestor* of all vertebrates.

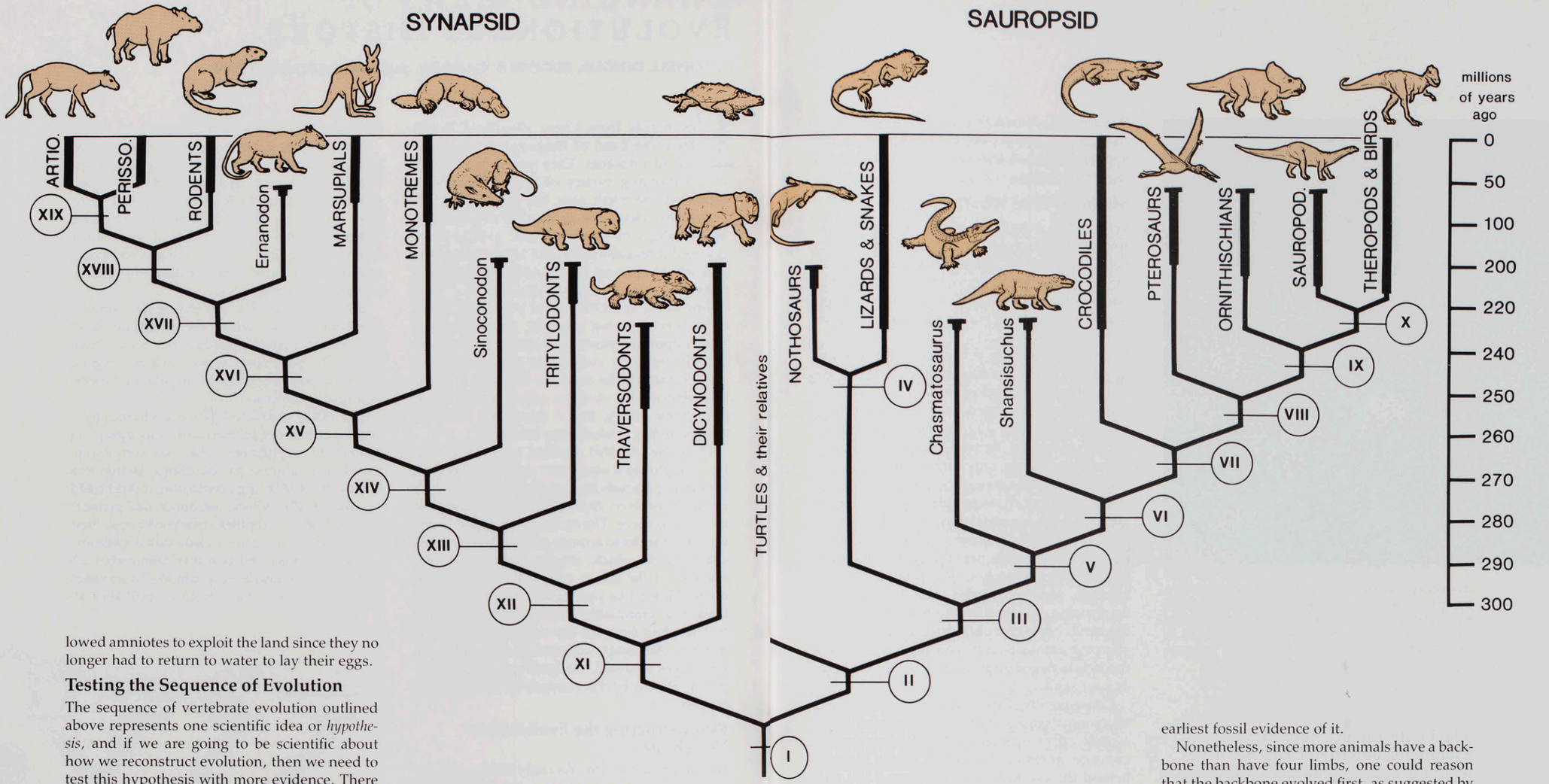
Other characteristics are shared by a smaller number of animals within the vertebrate clade. For instance, frogs, lizards, and horses have four limbs with bony wrists, ankles, fingers, and toes. So these animals are called *tetrapods,* meaning "four-footed."

Still other characteristics are shared by a smaller number of animals within tetrapods. In contrast to amphibians, which lay soft unprotected eggs in moist surroundings, lizards and horses develop in eggs containing a fluid-filled sac, the amnion, which surrounds and protects the embryo. So, reptiles, mammals, and their early relatives comprise a clade called *amniotes.*

Eggs of reptiles and primitive mammals such as the platypus also have a hard shell surrounding the amnion. These features probably al-



We see a pattern in the diversity of life when we look for characteristics that are shared by different organisms. This pattern of characteristics can be used to arrange organisms into large groups that in turn contain smaller groups, thus giving an indication of how these groups evolved and allowing us to interpret the sequence of evolutionary history. The illustrations on the lower right of this tree, or cladogram, show the characteristics that distinguish these groups from others. Bony fish have backbones, as do amphibians, sauropsids (lizards, turtles, snakes, crocodiles, dinosaurs, and birds), and horses. We all know fish are not tetrapods, that is, they do not have four feet, but the other groups do. The final characteristic, development from an embryo protected by an amniotic sac, is shared only by horses and lizards. Since having a backbone is more widespread than having four limbs, the backbone is thought to have evolved first. The fossil record confirms this.



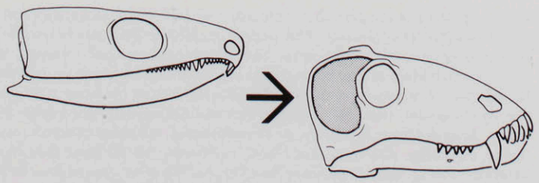
*This cladogram shows the evolutionary relationship of the Chinese fossils in the **Land of Dragons** exhibition. This is not a comprehensive or complete outline of vertebrate evolution. A timescale is presented on the right. Thickened portions of the vertical lines represent timespans for which fossils are known for the groups.*

lowed amniotes to exploit the land since they no longer had to return to water to lay their eggs.

Testing the Sequence of Evolution

The sequence of vertebrate evolution outlined above represents one scientific idea or *hypothesis*, and if we are going to be scientific about how we reconstruct evolution, then we need to test this hypothesis with more evidence. There are a few simple ways we might conduct such tests:

First, we can continue to look at more animals and more characteristics to see if the sequence of evolution suggested by the derived characteristics discussed earlier is matched or contradicted by other characteristics. If newly examined characteristics fit the groupings and sequence proposed earlier, the hypothesis is supported. If not, we may need to examine the contradictions closely and revise our idea about the evolutionary sequence. The sequence discussed earlier, however, is actually supported by many more derived characteristics than the few we listed, so it is stable and very thoroughly tested.



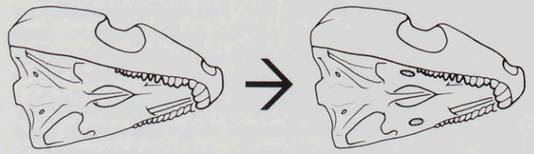
One opening in the skull behind the eye is the derived character. This region is solid in the primitive condition.

Second, we might look at the sequence in which characteristics develop as an animal grows to see if it corresponds to the sequence of derived characteristics suggested by moving from larger groups or clades into smaller clades. The development of an animal is called its *ontogeny*. Although this growth record does not necessarily reproduce the exact sequence in which characteristics evolved, in some instances it is a useful test.

For instance, in terms of our previous example, a backbone appears earlier in the development of a horse or lizard than do the four limbs, just as the sequence developed from studying derived characteristics would suggest. Further, the limbs appear before the amnion, which can't develop before the mother reaches sexual maturity. So, our test based on ontogeny corresponds with the sequence suggested by derived characteristics.

Finally, although it is incomplete, the fossil record can be compared with the evolutionary sequence based on derived characteristics. That the fossil record does not preserve all the ancestors and descendants that have ever lived is a problem; however, it does provide a glimpse of the vast diversity that once existed. It also provides us with hard evidence for the minimum age of clades. In other words, because the fossil record is incomplete and doesn't necessarily preserve the common ancestor of a clade, the age of the clade may well be older than our earliest fossil evidence of it.

Nonetheless, since more animals have a backbone than have four limbs, one could reason that the backbone evolved first, as suggested by the sequence of derived characteristics. The fossil record appears to confirm this idea, because the first known vertebrate lived about 500 million years ago, whereas the earliest known tetrapod dates back only about 350 million years. In addition, the earliest known amniote is only about 300 million years old, which also corresponds to the sequence based on derived characteristics.



An opening in the roof of the mouth, below the eye, is the derived character. A solid roof of the mouth is the primitive condition.

A derived characteristic for synapsids is a single opening on each side of the skull behind the eye. Having this region completely covered by bone is the primitive condition (above). The 230 million-year-old skull of Lystrosaurus *shows these openings.*

The Evolution of Dinosaurs, Mammals, and their Early Relatives

With this framework for constructing groups within groups, we can list nineteen major steps in the evolution of vertebrates leading toward mammals and dinosaurs (see page 27). This is not a comprehensive or complete outline of vertebrate evolution; instead, it relates only to those specimens in the **Land of Dragons** exhibition.

At each step, we name the clade and list one character that was inherited from the common ancestor or first member of the clade. Since the common ancestor may not have been preserved in the fossil record, we may not know exactly what it looked like, but if our evolutionary sequence is correct, we do know that it must have had the derived characteristic shared by later members of the group.

As shown on the cladogram above, amniotes split into two lineages about 300 million years ago. The one on the right leads toward dinosaurs including birds through steps with characteristics II through X, and the other on the left leads toward mammals along steps XI through XIX. Now let's focus on a few dramatic changes that use of cladistics has created in our understanding of the evolutionary history in these two clades.

Mammal-Like What?

Vertebrates, tetrapods, and amniotes are examples of long-recognized groups that need no revision. However, because cladistic methodology requires us to reorganize animals into clades containing *all* the descendants of a common ancestor, some widely recognized groups must be abandoned.

One good example is the group that used to be called "mammal-like reptiles." These included bizarre fin-backed forms, such as *Dimetrodon* and stocky fanged animals, such as *Lystrosaurus* (see page 32). In fact, there do not appear to be any derived characteristics that these animals share only with reptiles and birds.

In contrast, "mammal-like reptiles" share numerous derived characteristics (for instance, XI and XII) with mammals and their other early relatives. One prominent feature is the presence of a single hole near the back of the skull behind the eye socket. The hole is called a synapse, and the muscles from the lower jaw for chewing pass through this hole and attach to the skull. No such hole existed in the skulls of primitive amniotes, but even you have one. It's the hole between your cheekbone and the body of your skull.

Consequently, *Dimetrodon*, *Lystrosaurus*, and all mammals including humans are members of a clade called Synapsida. We all arose from a common ancestor that had a single synapse behind the eye socket. So, "mammal-like reptiles" aren't really reptiles at all; they're actually early relatives of mammals.

Reptiles or Sauropsids?

What about the group called, simply, "reptiles?" "Reptiles" are usually considered to be turtles, lizards, snakes, and crocodiles, along with a host of extinct animals including the large, commonly recognized dinosaurs. But when we construct a cladogram based upon derived characteristics (see page 31), we see that some descendants of the first "reptiles" are excluded—birds, for example. In addition, characteristics used to define "reptiles," such as scaly skin and the absence of internal temperature control, apply not just to "reptiles," but probably also to other primitive amniotes, such as *Dimetrodon*. In fact, there are no derived characteristics that apply only to "reptiles."

However, if we include birds along with the "reptiles" in a group called Sauropsida, there

are features that appear to have been derived from the common ancestor of all these animals. One of these derived characteristics (II) is a pair of openings in the bones that make up the roof of the mouth (unfortunately, their function is not yet well understood).

Even within sauropsids, we see that cladistics tell us some fundamental things about which animals are most closely related to each other. For example, do you think crocodiles are more closely related to lizards or birds?

Based on their overall appearance, you might suspect that lizards are closer relatives. One can find characteristics that are shared by crocs and lizards. For example, both have two pairs of holes in the skull behind the eye socket, through and around which the muscles of the lower jaw attach to the skull (III). However, the earliest known bird, *Archaeopteryx*, also has these openings. So, this characteristic is not shared only by lizards and crocs. Consequently, lizards, crocs and birds are all members of the group called Diapsida, named for the two openings behind the eyes.

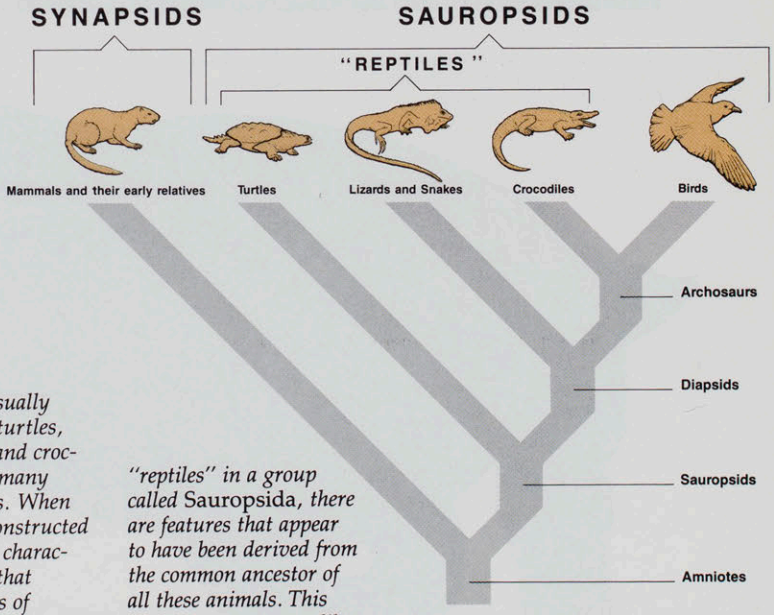
By the same token, if crocs are more closely related to birds, they should share some uniquely derived characteristics not seen in lizards, and, in fact, they do. Among other features, primitive crocodiles and birds, along with extinct forms of dinosaurs, possess an opening in the snout between the eye and the nose (V). Again, its function is not clearly understood. Nonetheless, it does establish that crocs *are* more closely related to birds, and both groups are members of the clade called Archosauriformes.

Are Dinosaurs Really Extinct?

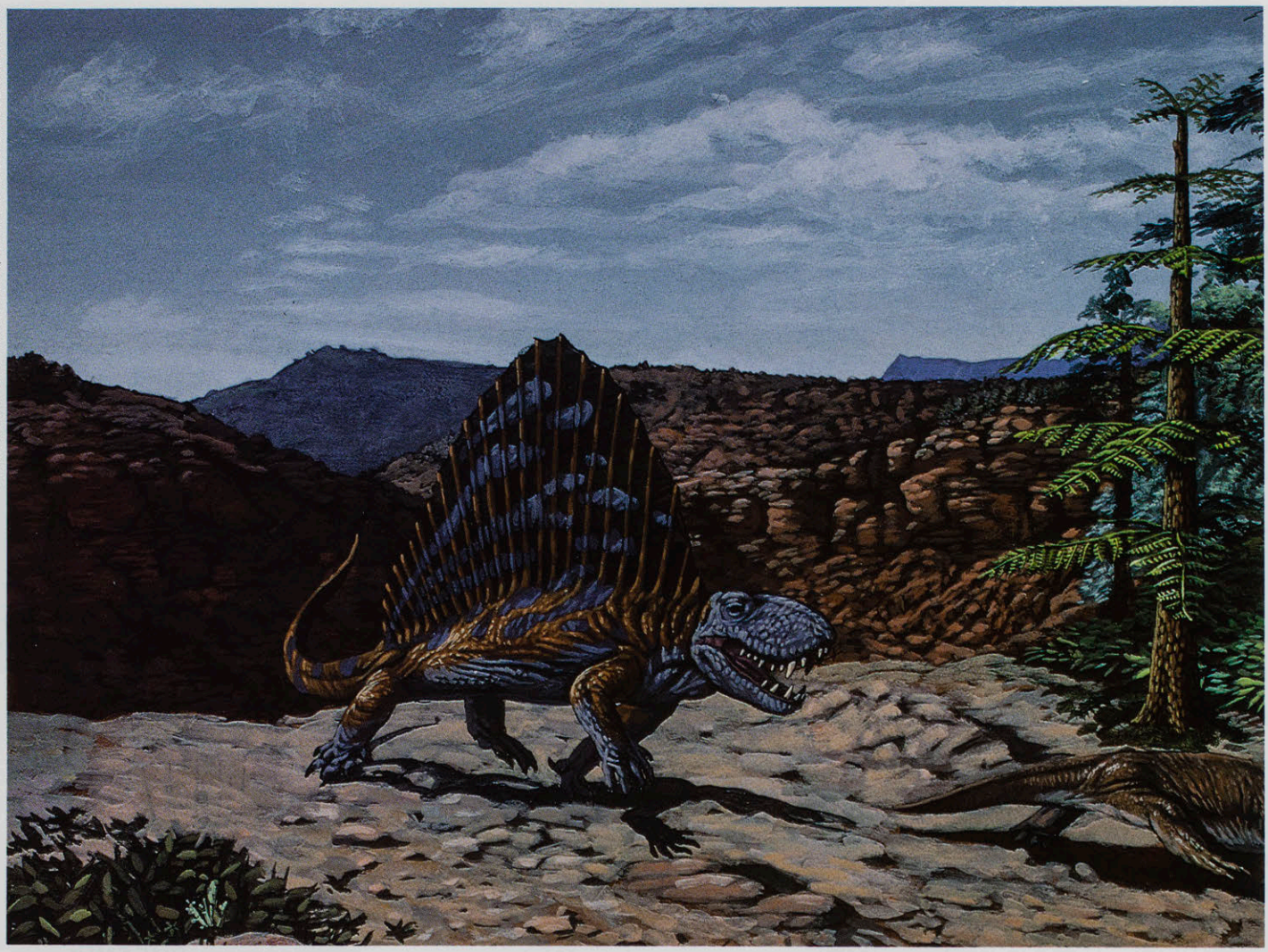
Dinosaurs differ from all other sauropsids, including crocodiles and pterosaurs, in having a fully erect stance in which the hind limbs are oriented directly under the body and swing in a fore-aft stride. More specifically, they have a hip socket with a hole in the center and a bony rim along the upper margin (IX).

More, primitive sauropsids have solid hip sockets. Lizards' and turtles' legs sprawl out to the side; forces generated by standing and moving are directed horizontally through the upper leg bone and into the center of the hip socket. So, the solid hip socket helps support the forces generated by standing. In dinosaurs, however, with the legs oriented directly underneath the body, those forces are directed vertically toward the top of the hip socket. The lip of bone along the upper margin provides added support and stability. No bone is needed for support in the center of the hip socket.

A derived characteristic for sauropsids is a pair of openings in the roof of the mouth below the eyes. Having a solid roof in the mouth is the primitive condition (above). The skull of a 70 million-year-old turtle from China shows this pair of openings.

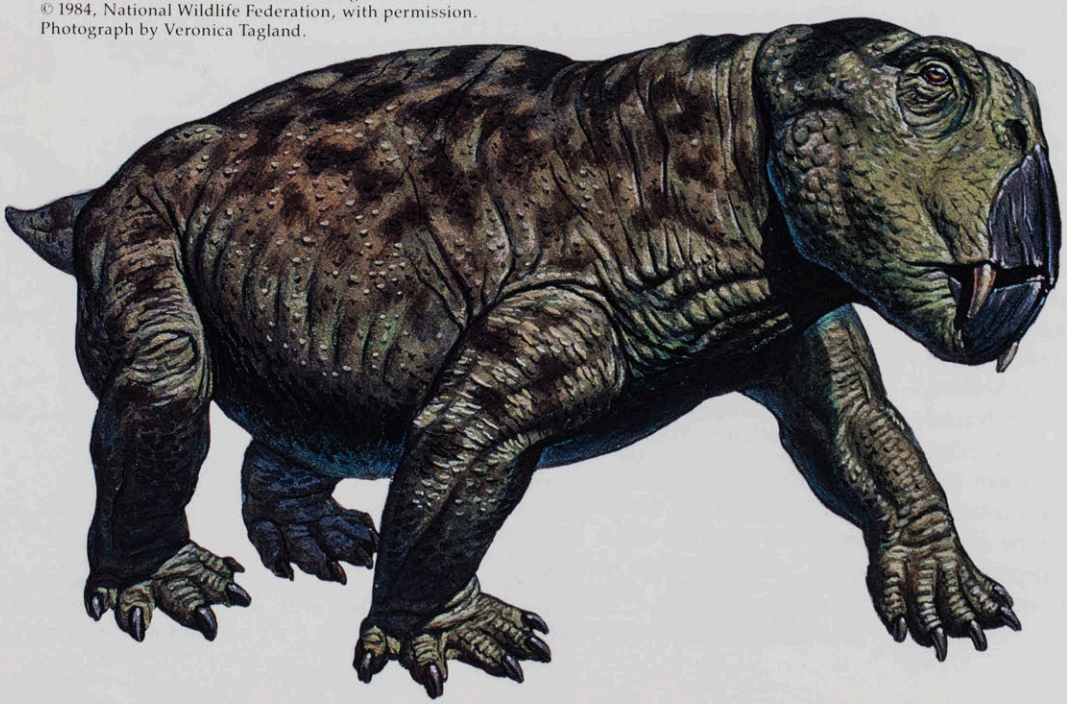


"Reptiles" are usually considered to be turtles, lizards, snakes, and crocodiles as well as many extinct dinosaurs. When a cladogram is constructed based on derived characteristics, we see that some descendants of the first "reptiles" are excluded—birds, for example. If we include birds along with the "reptiles" in a group called Sauropsida, *there are features that appear to have been derived from the common ancestor of all these animals. This diagram shows crocodiles being most closely associated with birds; it also indicates that the split between the mammal and other vertebrate lineages took place early on.*



Dimetrodon © 1976 Mark Hallett, from the collection of Donald Glut.

Lystrosaurus artist Mark Hallett for *Ranger Rick's Dinosaur Book*, © 1984, National Wildlife Federation, with permission. Photograph by Veronica Tagland.



Vertebrates, tetrapods, and amniotes are examples of long-recognized groups that need no revision. If we reorganize animals into groups containing all *the descendants of a common ancestor, some widely recognized groups must be abandoned. One good example is the group that used to be called "mammal-like reptiles." These include the bizarre fin-backed* Dimetrodon *(top) and the stocky* Lystrosaurus *(left). There are shared characteristics uniting these animals and mammals in the group Synapsida, so they are more closely related to mammals than to "reptiles" or Sauropsida.*

Increased stability is also indicated by the greater number of vertebrae that attach to the hip bones or pelvis. Earlier sauropsids had one or two, but dinosaurs have five.

Paleontologists long thought that upright posture facilitated faster running. Recent research with living animals suggests, however, that some animals with sprawling posture can move as fast as most animals with upright posture, at least over short distances. The difference is that the side-to-side locomotion of sprawlers constricts the lungs, thereby decreasing endurance. The chest is not deformed when an animal runs upright, so its endurance at fast speeds is greater.

Now, let's look at birds. The legs of birds are oriented directly underneath their bodies, just like dinosaurs. Their legs move in a fore-aft stride. Their hip socket has a lip of bone along its upper margin, and at least five vertebrae are attached to the pelvis... sound familiar? These are all uniquely derived characteristics that birds share with all other dinosaurs. Clearly, they were inherited from the common ancestor of all dinosaurs. And, since the clade called dinosaurs is required to contain the common ancestor and *all* its descendants, then birds *are* dinosaurs.

So although many people think dinosaurs are any large extinct animal, they are actually a particular group of sauropsids that includes birds. And as a result, dinosaurs were not only the most prominent land animals between 220 and 65 million years ago, they are also the dominant animals in the skies today.

Where Do We Go from Here?

For systematic biologists using cladistics to revise and reconstruct evolutionary history, the job has just begun. The cladogram presented in this article is supported by a good deal of evidence. Many more derived characteristics are known than have been listed. As mentioned earlier, however, this cladogram actually represents only one possible hypothesis for the sequence of evolution within amniotes. So, it needs to be continually tested by analyzing more characteristics, developmental data, and fossils. Indeed, changes within the smaller groups that have been discussed, such as within lizards and birds, are proposed in new scientific articles every week.

If this present hypothesis or cladogram withstands further tests, we may continue to believe that our interpretations of the fossil evidence are correct. However, if further study reveals derived characteristics that suggest other evolutionary relationships, then our views will once again have to be changed through the on-going process of scientific testing.

Lowell Dingus is Exhibitions Coordinator for the ***Land of Dragons*** *exhibition. Eugene Gaffney is Curator of Vertebrate Paleontology at the American Museum of Natural History. J. Willard Whitson is the Designer of* ***Land of Dragons*** *exhibition.*

From the Land of Dragons

Fifty-one vertebrate fossils from the People's Republic of China—the most comprehensive collection of fossils from China ever to be presented in the Western hemisphere—will be on display at the Natural History Museum from June 17 to October 15. The exhibition also includes 22 fossils from the American Museum of Natural History's collection and from other institutions. The American Museum organized the exhibition in conjunction with the Institute of Vertebrate Paleontology and Paleoanthropology in Beijing.

From the Land of Dragons includes skeletons of extinct groups such as dinosaurs and pterosaurs, but it is particularly rich in fossils that shed light on the origins of such modern groups as turtles, crocodiles, and mammals. A spectacular feature of the exhibition is a 24-foot rock slab with the skeletons of nine dicynodonts, distant relatives of mammals (see TERRA, March/April 1988). These tusked plant eaters became extinct about 200 million years ago; their fossils are known from all continents, including Antarctica and Australia, and provide evidence of continental drift.

Check the June/July *Calendar* for events planned in association with the exhibition.

Supplementary Reading List

General

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Technical

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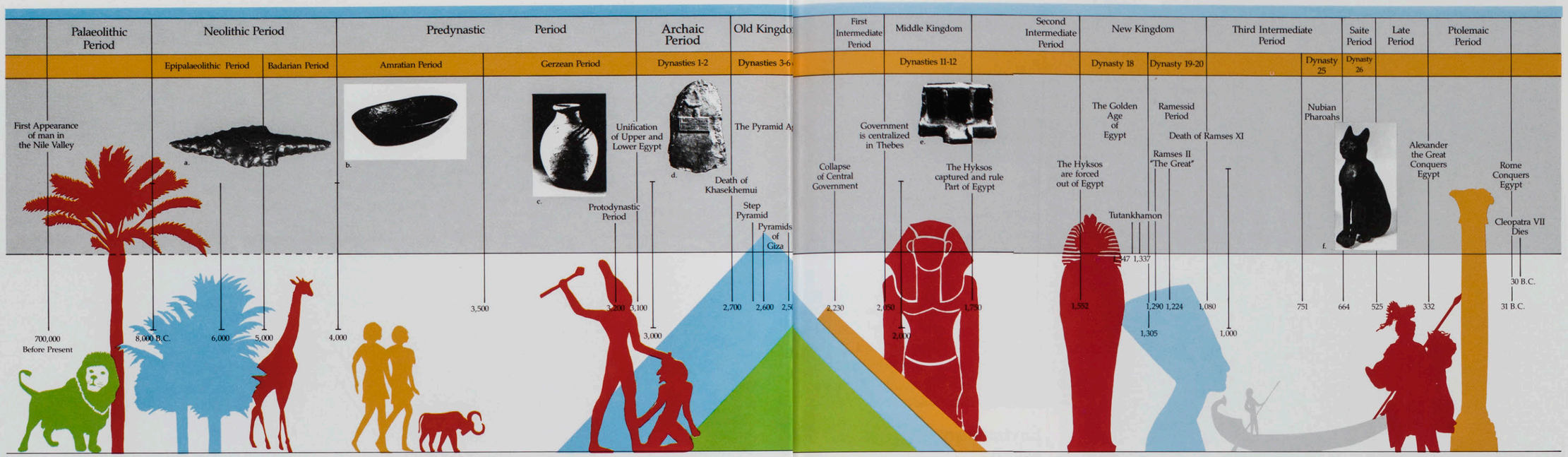
Schoch, R. *Phylogeny Reconstruction in Paleontology.* Van Nostrand Reinhold Co., 1986: pp. 1–351.

An Introduction to The Predynastic Period in Egypt

by MICHAEL ALLEN HOFFMAN

a. Stemmed Microlith Point; The Charleston Museum, South Carolina (ARM 311). b. Dish; Royal Ontario Museum, Toronto (900.2.103). c. Jar; Royal Museum, Toronto (910.85.79). d. Stela; The Petrie Museum, University College London (UC 14271). e. House Model; Gift of Egyptian Research Account; Museum of Fine Arts, Boston (07.551A). f. Statuette; Florence Museum, South Carolina (933).



Timeline of Egyptian history from the First Egyptians to Cleopatra.

The Search for the Origins of Egyptian Civilization

The idea that the impressive achievements of Egyptian civilization could have developed normally from prehistoric roots without significant foreign influence has been difficult for many to accept. For most, ancient Egypt is defined by the soaring pyramids, massive temples, mysterious mummies, and extraordinary art of pharaonic times. The search for the origins of Egyptian civilization—for the first Egyptians—has long been the subject of academic debate and popular interest, most of it sober, some of it outrageous. In the last two decades the focus has shifted from the armchair back to the field, where there has been a resurgence of archaeological excavations in such settlement sites as Hierakonpolis—which has been the focus of interdisciplinary research since 1967. The patient application of modern scientific techniques has yielded discoveries that allow us to trace Egypt's cultural origins by establishing an unbroken succession of social and economic development linking Pharaonic Egypt to its Predynastic past.

Before reviewing the chronology, environment, and cultural development of Predynastic Egypt based on the contributions of new archaeological research, the significance of this period (roughly between 4000 to 3100 B.C.) for world prehistory needs to be considered in light of the broader issues of human social evolution. Studying anew the origins of ancient Egyptian civilization has a special relevance for us because it offers an explanation for one of the oldest and most vexing questions in human history: how and why did the world's complex societies evolve? Although prehistory may reach back four to five million years, humans have lived in nation-states (large, centrally governed geographical areas) for only about five thousand years—a mere one-one-thousandth of that period.

At the end of the Pleistocene era (ca. 8000 B.C.) most of our ancestors hunted, fished, and gathered wild plants to survive. Settlements were generally small seasonal camps inhabited by two or three families that totaled twenty to thirty people. Social differences were minimal and based primarily on age and sex. There were no chiefs, no kings, no priests. Leaders and shamans accumulated no wealth nor could they pass on their authority.

The introduction of domesticated plants and animals (at different times in different areas of the world) changed all this by allowing a rapid increase in population and an accumulation of wealth and power. At first, camps grew into permanent villages; soon towns of a few hundred swelled to cities of thousands. The division of labor became more complex as full-time artisans (potters, woodcarvers, metal workers, traders) and early rulers—chiefs and priests—appeared. Wealth and power were accumulated and passed on within families.

Out of this milieu, the world's six original independent civilizations arose—Mesopotamia, Egypt, the Indus Valley, China, Mesoamerica, and Peru. Of these early complex societies, Egypt provides the first and only example of a politically centralized nation-state. When, where, how, and why did such an extraordinary social revolution occur? While it is difficult to answer all these questions, let us consider some of the related issues in the light of past discoveries and ongoing research.

Chronology

Egyptian prehistory, the time before writing, is generally divided on the basis of major stylistic, technological, and economic changes such as methods for manufacturing stone tools, the use of pottery, and the appearance of agriculture. Ancient Egyptian history is broken down into 32 dynasties or ruling houses based on a chronological scheme devised by the priest Manetho (see Table 2, page 42). Manetho, a native Egyptian, wrote a condensed history of his country for its Macedonian ruler Ptolemy II about 280 B.C., drawing on ancient lists of kings preserved on papyrus rolls and engraved on temple walls. Manetho wrote in Greek—the international scientific language of his day. Since the time of Thucydides in the mid-fifth century B.C., Greek authors had striven to write history in terms of cause and effect—a method that underlies all modern historiography and social sciences. This method contrasts radically with the ancient Egyptian approach, which stressed the central and mystical role of the divine Pharaoh as a champion of timeless traditional values. The history of Egypt produced by Manetho was little more than a chronicle of idealized events, arranged from youngest to oldest, according to the reign of a particular king.

Until the turn of the century, we possessed no concrete evidence for Manetho's first two dynasties. In the late nineteenth century William Matthews Flinders Petrie, the father of modern archaeology in Egypt, excavated the tombs of Egypt's first monarchs at Abydos. Petrie recovered all the tombs of the First Dynasty kings (ca. 3100 to 2900 B.C.) plus the tombs of Peribsen and Khasekhemui from late in the Second Dynasty (ca. 2900 to 2700 B.C.). Petrie also found some tombs belonging to local late Predynastic rulers, such as Ka and Irj Hor. The finds at Abydos not only supported Manetho's chronology and illustrated the material culture of earliest Dynastic times, but clearly showed connection to the preceding Predynastic epoch. Despite its limitations and errors, Manetho's work continues to provide historians with a useful chronological

The Petrie Museum, University College, London

*This jar is the oldest example of pottery in the **First Egyptians** exhibition. It was crafted between 5000 and 4000 B.C. and excavated from a tomb in Badari, Egypt. It exemplifies the refinement of the ceramic art already achieved by the Badarians, the earliest Predynastic Egyptian people. The Badarians farmed and raised domesticated animals; they plied the Nile and enjoyed a mobility and ease of transport that helped unify the Upper Egyptian Predynastic cultures.*

framework.

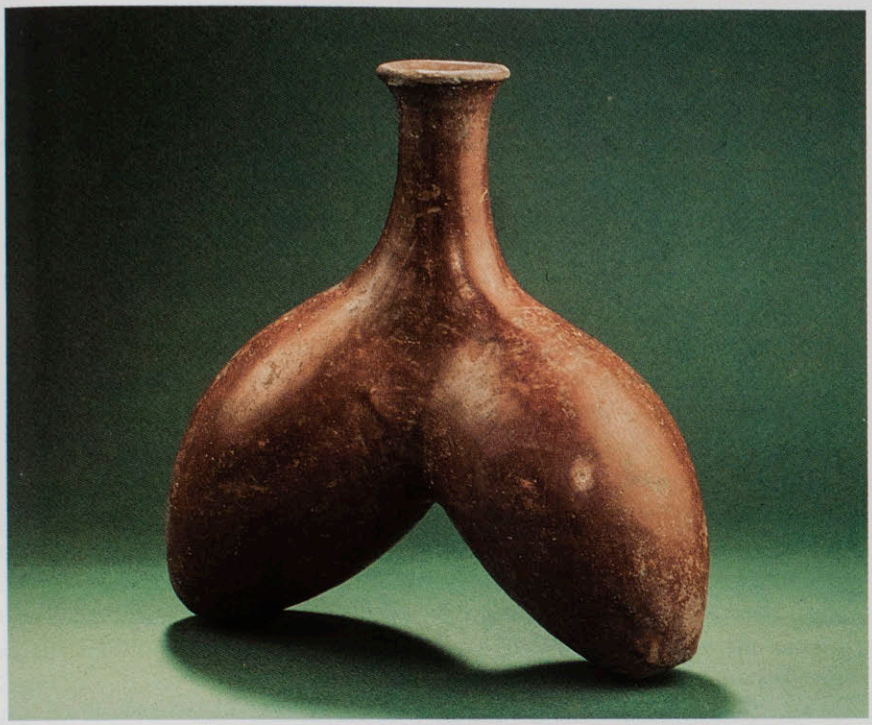
In Egypt, the line between history and prehistory is drawn at the very beginning of the First Dynasty (ca. 3100 B.C.) and marked by the use of hieroglyphic writing. This is an arbitrary division, since the origin of writing probably dates back several centuries into the Predynastic and since the earliest historical inscriptions (such as those on the Narmer Palette, which is pictured on the cover of the April/May TERRA CALENDAR) are short and of limited use.

There are two principal prehistoric epochs in Egypt—the *Palaeolithic* and *Predynastic*. Generally speaking, Palaeolithic peoples hunted, foraged, and fished, while Predynastic peoples practiced agriculture and herding. The names used to characterize major periods within the Palaeolithic era reflect a simple separation into Lower, Middle, and Late, while Predynastic divisions generally derive from the names of particular archaeological sites, such as Badari, Amrah, Gerzeh, and Naqada. Typical Palaeolithic cultural remains are found that date no more recently than about eight thousand years ago. The Predynastic, by contrast, began shortly before 4000 B.C. and ended with the political unification of Upper and Lower Egypt under the first kings of the First Dynasty about 3100 B.C. The Predynastic is usually divided into the following periods: *Badarian* (ca. 4000 to 3800 B.C.), *Amratian* (ca. 3800 to 3500 B.C.), *Gerzean* (ca. 3500 to 3200 B.C.), and *Protodynastic* (ca. 3200 to 3100 B.C.). The gap between Late Palaeolithic and early Predynastic (ca. 8000 to 6000 B.C. to ca. 4000 B.C.) was a time of transition from hunting and gathering to farming cultures and is still poorly known. Archaeologists use the term *Epipalaeolithic* to designate the late Palaeolithic cultures (ca. 8000 to 5000 B.C.) and *Neolithic* (ca. 6000 to 4000 B.C.) to identify the first farming communities of the Nile Valley.

Environment

The geographical divisions of Egypt—both ancient and modern—provide spatial starting points for understanding the environment in which Egyptian civilization evolved. Ancient Egyptians conceived of their country as *Tawy*, the Two Lands. Upper or southern Egypt comprised the Nile Valley from Aswan to roughly the site of modern Cairo. Lower or northern Egypt consisted of the river's delta from its apex at Cairo to the Mediterranean coast.

Egypt's unity arose from the life-giving Nile; the geographical and cultural divisions implicit in the terms Upper and Lower Egypt were likewise products of cultural and ecological differences created by the river and climate. On the one hand there was the fertile alluvial black land or *kemet*, which contrasted strikingly with the barren desert frontiers, the red land or *deshru*. The tension created between these two environments, and the cultures they spawned, dominated both Egyptian prehistory and history for tens of thousands of years.



Royal Ontario Museum, Toronto

This Amratian double jar is thought possibly to be a yogurt maker. The Amratian people lived around 4000 B.C. and developed directly from the Badarian culture that preceded it. Their tombs, however, are larger and more richly furnished than those of their predecessors. The first identifiable symbols of royal power are found in Amratian tombs. Everyday life was likely highly organized on a proto-industrial scale.

The ancient Greek geographer Herodotus, writing about 450 B.C., noted the importance of the river Nile for Egypt's unparalleled wealth. Without the Nile, virtually all Egypt would be desert. The rich black soils deposited by its annual floods made it one of the great granaries of the ancient world. Those yearly inundations—the result of monsoon rains falling on the far-off Ethiopian highlands and filling Lake Tana—were both the source of Egypt's wealth and the cause of its greatest perils. If the river ran too high or too low, famine and chaos stalked the land. The long, easily navigated course of the Nile also became a highway for commerce, people, and ideas that flowed between Africa and the Middle Eastern and Mediterranean lands.

In the past, the Sudanic rain belt has temporarily shifted north, radically transforming the Sahara. In a naturally arid land like Egypt, even a minute increase in precipitation brings about a rapid alteration of the total ecosystem. Such changes have occurred several times in Egyptian prehistory with important consequences for human culture. Climatologists, botanists, zoologists, and archaeologists have undertaken research that allows us to reconstruct several of the important rainy periods, known as *pluvials*, in northeastern Africa during the last 300,000 or more years.

The last pluvial is the most important for Predynastic development. It created a special set of environmental conditions that triggered the settlement of the newly verdant Saharan grasslands and the rapid adoption of herding and farming strategies by the colonists. Most experts now believe that food production and animal domestication originated in the Middle East and quickly spread into northern Africa around 6000 B.C.

Almost certainly the new way of life originated as a trickle of people and ideas rather than as a flood of immigrants. Indigenous peoples adopted many of the cultivated plants and domesticated animals; the new subsistence strategies began to subtly change social groups. Innovations were especially welcome among the colonists of the Sahara, who were sensitive to exploiting a newly available habitat and aware of the advantages a fresh economic strategy could produce. To the Middle Eastern domesticates, Saharan peoples added a strong emphasis on cattle raising that was later echoed in the political and religious symbolism of Pharaonic Egypt and other African cultures.

Early Neolithic Cultures of Egypt and the Sudan

Ironically, this neolithic lifestyle seemed to leapfrog the middle and upper Egyptian Nile Valley. Between 6000 and 5000 B.C., herding and horticulture appeared through the Nile Delta, Egypt's Western Desert, and back into the Sudanese Nile valley.

Between 5500 and 4000 B.C., rainfall grew more erratic and lakes and streams dried up while the population continued to grow. The increased need for food forced pastoral and horticultural peoples north and east, and some settled in the central and southern Egyptian Nile Valley. In mixing with or displacing indigenous food gatherers, these Neolithic peoples laid the foundations for the earliest Upper Egyptian Predynastic culture—the Badarian. Ultimately, the Pharaonic civilization arose from Badarian culture.

The Badarian Period

As yet we have no direct evidence of the ancestry of Badarian culture. Recent discoveries suggest the kind of primitive Neolithic society from which the Badarian probably evolved, and unsubstantiated reports from the Eastern Desert and

finds in the Sudan suggest similarities with early Badarian ceramics and may provide a clue to the origins of these peoples. Still, the search for Badarian origins remains one of the great unsolved mysteries of Egyptian archaeology.

We generally date the beginning of the Badarian Period sometime between 5500 and 4000 B.C. and its end about 3800 B.C. The Badarian seems to have developed in central Egypt between the modern cities of Assiut and Tahta about 350 kilometers (210 miles) south of Cairo. Although this is assumed to be the Badarian heartland, it may simply be that accidents of discovery and preservation have biased our sample, so that when other regions are better explored the core area of the Badarian might be extended.

Unfortunately, we know little of Badarian settlements. Architecture was apparently in wood and mud-plastered reed, but most of the excavations were conducted at the turn of the century and excavation techniques were generally not geared to recovering such evidence nor to examining ancient settlement and community plans. There is evidence that the Badarians made their clothing from both tanned leather and extremely fine linen. They wove fine baskets and mats, and their cultivated crops included wheat and barley for food and flax for linen. It is doubtful whether they employed irrigation. Domesticated animals included the familiar sheep, goats, cattle, and pigs.

The Badarian, like later Predynastic cultures, showed a tendency toward ornamentation and an emphasis on the burial of rich grave goods in simple oval tombs—traits that distinguished it from contemporaneous groups in the Western Desert and the Nile Delta, but which it apparently shared with its Sudanic Nubian counterparts. The presence of clay boat models in tombs reminds us that Badarians already plied the Nile and enjoyed a mobility and ease of transport that helped unify the Upper Egyptian Predynastic cultures.

Although comparatively modest by later Predynastic standards, Badarian grave goods reflect a society stratified by differences in wealth and status. There is good reason to believe that local chiefdoms existed and that the mortuary cult had become a critical focal point for marshaling and displaying wealth, legitimizing authority, and communicating religious beliefs. Not coincidentally, the time-honored practice of tomb robbery seems to have originated during the Badarian.

The Amratian Period

The Amratian period developed directly from Badarian roots, as is proven by striking similarities in artifacts and the persistence of distinctive burial practices; there is also stratigraphic continuity between the two periods at Hemamieh. What remains unclear is whether and to what degree other non-Badarian cultures might have contributed to the Amratian.

Numerous radiocarbon estimates suggest that the Amratian began somewhere between 3800 and 3700 B.C. and lasted until about 3500 to 3400 B.C. Characteristic Amratian pottery is distributed widely throughout the Nile Valley. The similarity of artifacts over an extensive area is explained by the efficiency of river transport. Although the succeeding Gerzean Period is famous for its representations of boats on rocks, pottery and tomb walls, the Amratians also painted river craft on their pots.

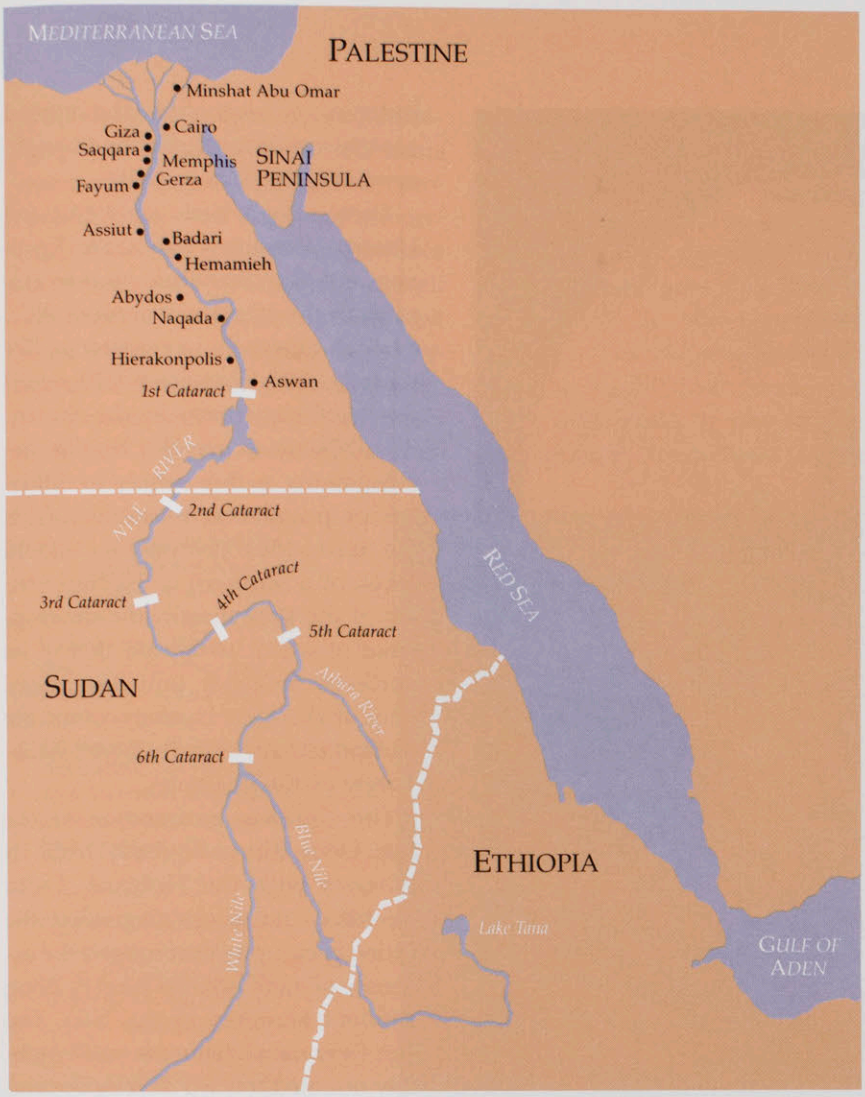
Another major factor that contributed to the spread of Amratian culture is the distinctive Predynastic death cult, which originated in the Badarian. Amratian tombs are generally larger and more richly furnished than those of their predecessors and reflect clear differences in wealth and status. Recent excavations at Hierakonpolis have shown that large, late Amratian tombs already had their own special precinct in a cemetery. While Badarian tombs were simply stocked, Amratian graves often held lavish amounts of vessels as well as utensils, weapons, jewelry, and other adornments. Among the most distinctive grave goods are ground and polished green and white porphyry maceheads. These latter objects are important because they are the first identifiable "powerfacts" or physical symbols of power. In ancient Egypt, as in more recent Western societies, maceheads were symbols of royal power and legitimate authority as well as of the king's prowess as a war leader. His-

THE FIRST EGYPTIANS

Director's Gallery through November 5

Although our familiarity with the culture of Pharaonic Egypt has grown rapidly over the last decade, much less is known of the world of the first Egyptians—the Predynastic peoples who laid the foundations of one of the world's earliest and most enduring civilizations. But who were these people? *The First Egyptians* exhibition explores this important question by portraying the recent discoveries made at Hierakonpolis. At this site, located 400 miles south of Cairo, a research team of archaeologists, artists, geologists, botanists, zoologists, and other scientists are investigating the life and culture of the Predynastic people. More than 150 artifacts tell the story of Hierakonpolis and the important discoveries made there.

The First Egyptians *was organized by the McKissick Museum and the Earth Sciences and Resources Institute of the University of South Carolina. National support for this exhibition was provided by the National Endowment for the Humanities. The Natural History Museum gratefully acknowledges local support from Bruce and Caroline Ludwig, Royal Athena Galleries, and the University of South Carolina.*



Egypt

toric Egyptian kings from Narmer to the Ptolemies—a period of over 3,000 years—were depicted wielding their maceheads against the heads of hapless enemies.

Evidence from settlement excavations and detailed regional surveys at Hierakonpolis prove that the production of maceheads, pottery, and probably many other items, including beer, used in the mortuary cult and in everyday life was highly organized on a proto-industrial scale. It now seems likely that "mortuary kits" of pottery, slate palettes, maceheads, stone vases, and ivory pins and other jewelry were exported up and down the Nile from such major centers as Hierakonpolis. The discovery of the first kilns for producing pottery adjacent to an elite Amratian cemetery further suggests the relationship between the growth of the powerful elite and the production of fancy items for the mortuary cult.

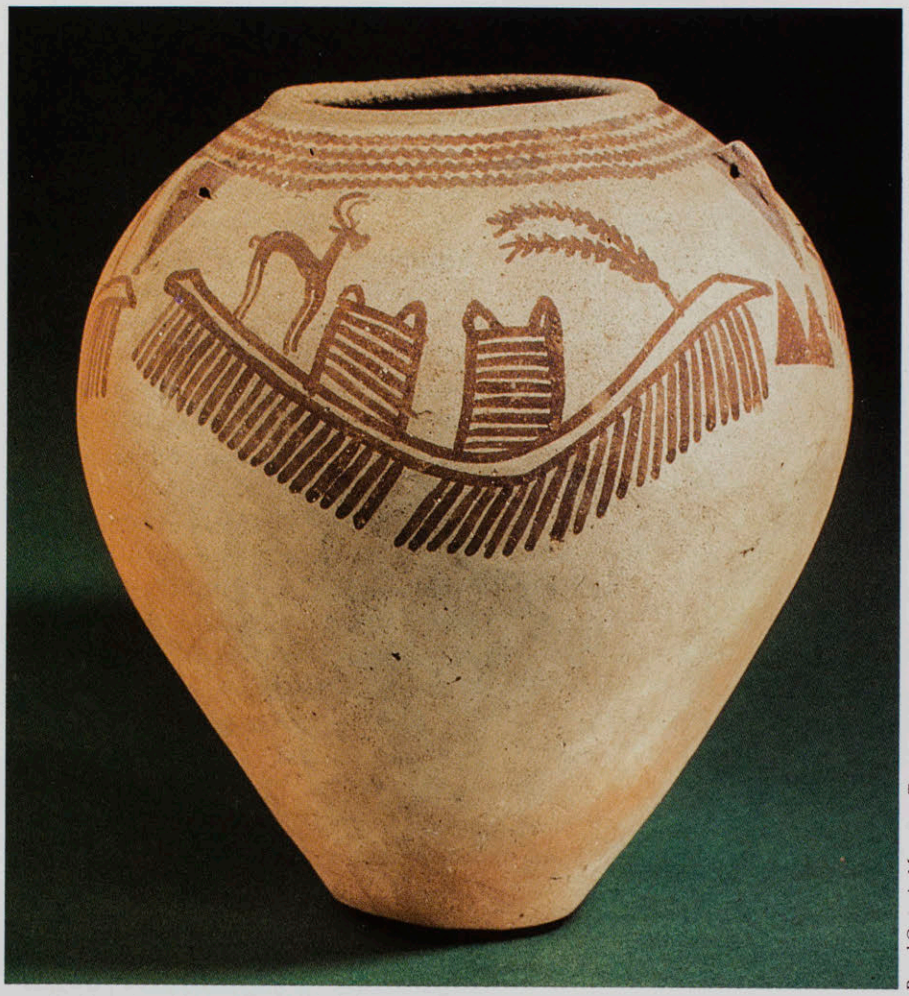
Extensive evidence from Hierakonpolis also reflects the size, variety, and extent of Amratian settlements. Two centers of settlement dominated the landscape from 3800 B.C. to 3500 B.C. Each included zones for habitation, industry, and trash disposal. Surrounding the two centers were smaller farming hamlets, herders' camps, cemeteries, and holy places. Dwellings ranged from small, circular huts in seasonal camps to more substantial rectangular houses of mud brick and wattle-and-daub in the towns.

Houses were sometimes bunched closely together and sometimes surrounded by spacious fenced enclosures. These dwellings, and the different, often specialized objects found in them, reflect underlying economic and social differences in the community that herald the eventual emergence of the politically powerful elite. The area covered by the housing sites—some 100 acres—suggests that during the Amratian Period the regional population of Hierakonpolis had soared from several hundred people to several thousand—between 2,300 and 10,500. Such large populations were essential to the development of a state.

Ethnographic studies of historic societies with subsistence strategies, and material cultures comparable to the Amratian, suggest that when the population size reaches a few thousand, the area governed extends well beyond a single community. Viewed in another way, the region needed to support the large and concentrated population of late Amratian Hierakonpolis must have extended well beyond the 10-kilometer (six-mile) stretch of the Nile that has been surveyed to date. Comparing late Amratian Hierakonpolis and Naqada to sites of the technologically similar Middle Mississippian culture of eastern and midwestern North America (ca. 900 to 1540 A.D.) we would expect centralized chiefdoms in control of hundreds of miles of territory, able to field large armies and engage in long-distance trade. So far, the evidence for Amratian chiefdoms is inferential, based on the evidence presented above as well suggestions of growing conflict (the models of fortified towns and arrows found in big tombs). By the succeeding Gerzean period, there is no doubt that chiefdoms and, eventually, regional kingdoms emerged that directly foreshadowed Pharaonic civilization.

The Gerzean Period

The Gerzean period evolved directly from the Amratian between about 3500 and 3400 B.C.; it developed in the Upper Egyptian Nile Valley from



Royal Ontario Museum, Toronto

Royal Ontario Museum, Toronto

indigenous roots and later spread southward into Nubia and northward into the eastern Delta.

There was a basic similarity and kinship between Predynastic Egyptian and Late Neolithic Nubian cultures in the fourth millennium B.C., evident especially in cemeteries like Kadada, 200 kilometers (120 miles) north of Khartoum in the Sudan. It is difficult to see the Nubian developments as due simply to diffusion or population movement from the north. Most probably we should speak of a southern or Nubian variant of the Predynastic, the development of which paralleled that of its northern neighbor until the beginning of the First Dynasty when the Nubian culture was destroyed deliberately by the pharaohs.

The Gerzean penetration of the Nile Delta differed greatly from its contacts with the Nubians. Delta Neolithic culture was diversified; the varied geography encouraged the existence of more isolated centers along different branches of the Nile. The first Gerzean settlements were probably oriented toward developing and protecting trade routes (for which abundant evidence exists) to Palestine and the Middle East. Throughout the Gerzean, people of the western and central Delta retained their indigenous Lower Egyptian Neolithic way of life. Occasionally trade and possibly war occurred between the Delta inhabitants and their Gerzean neighbors. The eventual conquest of the central and western Delta peoples by later Protodynastic kings, such as Narmer, was possibly motivated by a desire to dominate the flourishing trade with the Middle East.

Our main evidence for Gerzean material culture and social and political organization comes from thousands of tombs excavated since Petrie's initial discoveries at Naqada in 1894–95. A key motif of ceramics found in Gerzean tombs anticipated

the familiar iconography and hieroglyphs of Dynastic times: river boats were often depicted, frequently propelled by oars and occasionally carrying cabins and shrines. Also evident on some of the pots usually carried on boats are totemlike standards on long poles that suggest the emergence of distinct territorial units.

Gerzean tombs provide abundant evidence that the trend toward increasing social stratification noted in the late Amratian graves at Hierakonpolis had become a dominant theme in Predynastic culture. The larger and more elaborate the tomb, the richer and more numerous were its contents. Big elite structures are apparent everywhere and were usually set apart from lesser graves. Large, rectangular tombs, lined with mud brick at Naqada and Hierakonpolis, suggest the presence of local kings. The large Painted Tomb at Hierakonpolis is elaborately decorated with wall paintings that recall the themes popular on the pottery of the time and that clearly anticipate the iconography of Dynastic times. In one scene, a local ruler raises his mace and prepares to dispatch several bound captives—a scene central to royal iconography for the next

Page 40, top: This Gerzean jar, dating from about 3400 B.C., is decorated in red-ocher paint with designs of three boats, antelopes, and plants. By the Gerzean period there is no doubt that chiefdoms and, eventually, regional kingdoms emerged that directly foreshadowed Pharaonic civilization. The river boat depicted on this jar anticipates the familiar themes of later Egyptian art.

Page 40, bottom: Model houses were sometimes placed in Predynastic tombs to provide the soul with a home for the afterlife. The practice of providing a "soul house" greatly increased in Dynastic times; this Gerzean house is a unique Predynastic example both in shape and decoration.

This Protodynastic model portrays a seated baboon holding its offspring between its paws. During the Protodynastic period (3100 B.C.) animals were buried around what seem to be royal cemeteries; some were crudely mummified. The animals were placed to correspond with their symbolic divine attributes. Baboons were associated with the dawn and were buried on the eastern periphery of the cemetery.

The Petrie Museum, University College, London. Photograph by Don Meyer.

TABLE 1 Predynastic Chronology of Ancient Egypt

Date (B.C.)	Upper Egypt	Lower Egypt
3100	Protodynastic	Protodynastic
3300	Late Gerzean	Late Gerzean/ Maadian
3500	Early Gerzean	Omari B?
4000	Amratian	Omari A?
5000	Badarian	Merimden/ Fayum A
(5500 ?)		

Table 2 Dynastic Chronology of Ancient Egypt

Period Name	Date (B.C.)	Dynasty
Archaic	3100–2700	I and II
Old Kingdom	2700–2230	III–VI
First Intermediate Period	2230–2130	VII–X
Middle Kingdom	2050–1750	XI–XII
Second Intermediate Period	1750–1552	XIII–XVII
New Kingdom	1552–1080	XVIII–XX
Third Intermediate Period	1080–664	XXI–XXV
Saite Period	664–525	XXVI
Late Period	525–332	XXVII–XXXI
Ptolemaic	332(323)–31	XXXII

3,500 years. Other scenes depict Southwest Asian motifs such as the "master of animals"—a man holding apart two rampant quadrupeds. The scenes are organized in roughly horizontal "registers" or bands—anticipating one of the principal conventions used in classic Egyptian relief and paintings.

Beyond the existence of such early royal tombs, the sheer amount of wealth interred in many Gerzean burials and the fine gradations of status reflected both in the size and elaboration of the tombs and in the grave goods themselves are striking. This was clearly a society on its way to statehood. The Painted Tomb shows kings, priests, and warriors and contains a wide range of imported items, which imply the existence of merchants and traders. In addition to the pottery industry of Amratian times, new craft specialists—including metal, stone, ivory and bone workers, carpenters, weavers, and painters—were plentiful.

Until recently, we had little knowledge of Gerzean settlements and architecture. The new evidence, which includes a temple complex from Hierakonpolis featured in **The First Egyptians,** hints at internally complex settlements paralleling the social complexity seen in Gerzean cemeteries. House models found in Gerzean graves provide information on the structure of Gérzean buildings; a house model from el Amrah shows a rectangular house similar to contemporary village mud brick structures. A small model interpreted as a town wall manned by two sentries was found at Abadiyeh and dates to the Amratian-Gerzean transition. Another model from the Royal Ontario Museum featured in **The First Egyptians** shows a ridge-pole structure decorated with painted and incised animal motifs.

By the end of the Gerzean, trends toward political unification and competition between regional states had reached a critical point, as indicated by a protective wall enclosure unearthed at Hierakonpolis. This three-meter (10-foot) thick wall was built during the transition of Gerzean to Protodynastic times.

The Protodynastic Period

The Protodynastic evolved directly from the late Gerzean, continuing earlier trends toward political and economic centralization. The century or so before Narmer and Aha (ca. 3200 to 3100 B.C.) was a time of ferment as powerful regional kings contended for dominance of the Nile Valley. In attempting to extend the Dynastic chronology back in time, many Egyptologists have tried to reconstruct a sequence of Protodynastic rulers based on cryptic references to semi-mythological monarchs who ruled before Menes, found in early king lists. Some concrete evidence for such kings is provided by the Scorpion Macehead and by several tombs at Abydos that Petrie attributed to rulers such as "Ka" and "Ro" (Irj Hor), who preceded Narmer.

The tombs and cemeteries of the Protodynastic reflect the emergence of large states in the Nile Valley. The elite precincts of late Amratian and Gerzean cemeteries evolved into the true royal necropolis at such sites as Hierakonpolis, Abydos, and Qustul, anticipating the great mortuary complexes of Archaic and Old Kingdom times.

In addition to distinctions of wealth and power, tomb types of the period suggest the presence of two distinct cultural provinces that may correspond to the ancient distinction between Upper and Lower Egypt. In northern, central, and part of southern Egypt elite tombs consisted of rectangular brick-lined pits, while poorer graves were generally less regular. From southern Egypt into Nubia another style of tomb design was used for both rich and poor burials. This southern style consisted of an oval or long rectanguler pit with a separate burial chamber set at roughtly right angles to the main pit and divided from it by one or more large stone slabs.

The recent discoveries at Hierakonpolis of a Protodynastic royal cemetery located along a dry desert stream or *wadi* suggest that the "northern" and "southern" style elite tombs were positioned symbolically, with the southern variant at the upstream or "Upper Egyptian" end of the site and the northern variant at the downstream or "Lower Egyptian" end. The fact that the southern style tomb is rock cut—the earliest in Egypt—emphasizes its extreme importance as does the presence of an animal cemetery around it. Given the popularity of animals and animal

processions in the royal iconography of the time, the presence of an animal precinct around the stone tomb reinforces its royal associations and perhaps indicates the different gods or provinces that supported the king. So far, animal remains identified include cattle, crocodile, elephant, gazelle, dog, and baboon. There is preliminary evidence of crude mummification as well as deliberate placement of certain species to correspond with their symbolic divine attributes. The baboons, for example, associated with the dawn, are located on the eastern periphery of the cemetery.

Regrettably, little is known about the settlements of the period. Only from Nekhen (Kom el Ahmar or ancient Hierakonpolis) do we have any architectural evidence and that comes from a limited stratigraphic exposure. Nevertheless, what we do have suggests that domestic and religious buildings employed the older techniques of wood and mud-plastered reed, although many of the larger structures of the period used mud brick and roughly shaped stone. The large mud brick enclosure wall begun in slightly earlier times at Nekhen persisted until the end of the Protodynastic and was then succeeded by a series of well-made mud brick rooms that apparently belonged to a First Dynasty administrative or industrial complex.

The overall Protodynastic settlement pattern in the Hierakonpolis region at this time (an area that was almost certainly the capital of Upper Egypt) shows the population concentrated around the administrative center of Nekhen. That such centralization occurred when a local rainy period opened up the desert for possible settlement emphasizes both the strength of the government and its stake in keeping population in a small, easily defended, and readily mobilized area. The military importance of towns and cities during the Protodynastic period is emphasized repeatedly by the artistic representations of walled and bastioned settlements shown on the great ceremonial palettes and also suggested by the hieroglyph for town—a circle (town wall) with a cross (two intersecting streets?) inside it.

Postscript—The Archaic Period

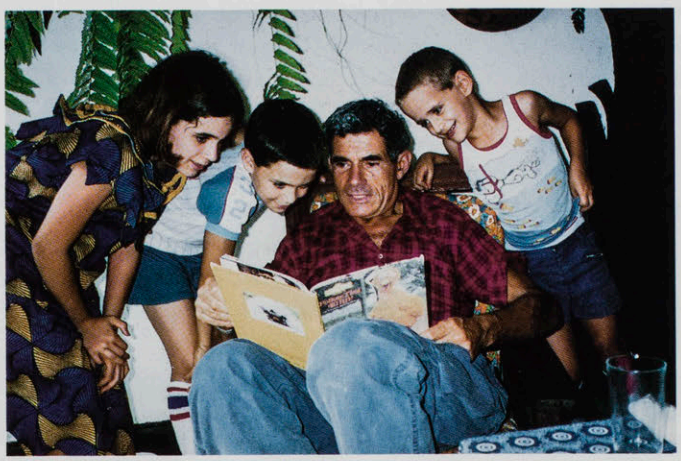
Around 3100 B.C. Egypt was united under the first king of the First Dynasty. According to Egyptian legend and the ancient king lists, his name was "Menes." According to most modern Egyptologists Menes should probably be identified with Aha (or Hor-Aha), the successor of Narmer. Others give the credit to Narmer. In either case, the material culture and subsistence economy of Archaic Egypt under the first two dynasties (ca. 3100 to 2700 B.C.) derived directly from Predynastic antecedents. The big differences we see reflect the extreme centralization of power under a pharaonic bureaucracy and the diversion of increasingly large amounts of surplus to the royal mortuary cult. Only gradually did Egypt assume a more homogenized look as the king fixed boundaries, monopolized trade, and expanded the royal workshops to control the production of desirable mortuary goods more thoroughly. These goods allowed the king to reward loyal clients and furnish his own vastly expanded tomb and mortuary temple. Some of the most striking technological developments of this period, such as in copper metallurgy and stone vase manufacture, directly reflect the demands of the mortuary cult and the use of royal patronage.

Although the Archaic period is technically historical in that we do have written names of kings, the few existent inscriptions are very short and often difficult to read. Therefore, our dating and broader cultural knowledge of this epoch is still heavily dependent on the techniques of archaeology. One of the main questions that has concerned Egyptologists working with the Archaic period is the true location of the royal tombs. Most agree that they were at Abydos, but a case can still be made, despite recent arguments, that the great tombs unearthed by Walter Emery at Saqqara were royal cenotaphs or "symbolic" tombs.

Another question of Egyptological concern involves the end of the Archaic and its last king (Khasekhem/Khasekhemui). During the Second Dynasty (ca. 2900–2700 B.C.) it appears that there was a civil war or at least a partial collapse of royal authority. The last two kings of the dynasty, Peribsen and Khasekhemui, were the only ones buried at the ancestral cemetery of Abydos and the only ones to take the unprecedented step of writing their names below the stylized Set animal as well as the traditional hawk of Horus. Once royal authority was reasserted, the stage was set for the classic period of Egyptian history—the Old Kingdom (ca. 2700 to 2230 B.C.). With the passing of Khasekhemui, Abydos was abandoned as a royal cemetery and soon great pyramid complexes were being raised at Saqqara just outside the capital city of Memphis, near modern Cairo. The beginning of the Pyramid Age—the zenith of pharaonic power—followed as Egypt evolved beyond the organizational structures and forms of its Predynastic and Archaic years. It should be noted that this rise of the Egyptian state was achieved at the expense of the pharaohs' ordinary subjects. Their tombs during the fabled Pyramid Age were but impoverished hovels compared to those of their Predynastic ancestors.

Professor Michael Allen Hoffman is Director of the Hierakonpolis Expedition and of the Egyptian Studies Association at the University of South Carolina's Earth Sciences and Resources Institute.

Continued from p. 6



Dr. James Clements shares Big Bird's adventure Follow that Bird! *with medical missionary children in Cameroon. Dr. Clements is traveling the world in 1989 to observe more bird species than ever sighted before in one year. The museum's Development Office is soliciting pledges for each bird species Dr. Clements sees in support of the new Ralph W. Schreiber Hall of Birds, due to open in summer 1990.*

have pledged their support to the Ralph W. Schreiber Hall of Birds and inspired Dr. Clements in his quest.

Ellen Adelman ■ David J. Barton ■ Mary Ann & Mike Bell ■ Mrs. F. Bernstein ■ Karen Bradley ■ Mr & Mrs. Charles Bragg ■ Pat Burns ■ George & Phila Caldwell ■ Chellie Campbell ■ Ann & Richard Cantrell ■ Rebecca Chapman ■ Sharon Cheney ■ Christina Clements ■ Dr. James Clements ■ Nicholas Collias ■ Mary W. Courtright ■ Janet & John Delmonte ■ Nena Dows ■ Anne & John Duncan ■ Dan Emmett ■ Michael Finnell ■ Linda Kay Foley ■ Peggy Forster ■ Walter Franz ■ Karen J. Friedmann ■ Kimball Garrett ■ George Gore ■ Ian Gow ■ Evelyn Graham ■ Mr. & Mrs. Ed N. Harrison ■ Dr. Patricia House ■ Dr. & Mrs. Thomas Howell ■ Hugh Huntington ■ Richard Ikkanda Design Group Inc. ■ Jeff Jagels ■ Marshall & Deeann Kass ■ Len & Melodye Kleinman ■ Mr. & Mrs. David Knight ■ Audrey Kopp ■ Dr. Frank Lavac ■ Mr. & Mrs. Ron Lee ■ R. A. Leland ■ Elaine Leventhal ■ A. Littler ■ Paquita Machris ■ Dr. Janet Magdovitz ■ Pamela & Herve de Maigret ■ Dr. & Mrs. Norman Mellor ■ Joseph Meltzer ■ Alvin & Sharon Milder ■ Tina Napuf ■ Oyama Family ■ Virginia Palmerston ■ Dr. Kenneth Parkes ■ Jean F. Platt ■ Betty & Tom Reddin ■ Mary Reeves ■ Dr. & Mrs. Thomas Roland ■ The Roth Group, Inc. ■ Larry Sansone ■ Marie Sansone ■ Santa Barbara Software Products ■ Charley Schoettlin ■ Elizabeth Anne Schreiber ■ Mr. & Mrs. Richard Schuur ■ Gretchen Sibley ■ Phillip Skonieczki ■ Arnold Small ■ Dr. & Mrs. T. Burton Smith ■ Susan Snelgrove ■ Jean Stone ■ Drs. James & Ellen Strauss ■ Mr. & Mrs. Hans George Struever ■ Anne Summerfield ■ Mr. & Mrs. David Taylor ■ Rose Taylor ■ Paul Thompson ■ Eleanor Vactor ■ Dr. Hartmut Walter ■ Dr. Nancy Warner ■ Barbara White ■ John Wigmore ■ Dick & Cynthia Wimer ■ Mr. & Mrs. John Woodlock ■ Peg Yorkin ■ Lorraine Young ■ Peggy & Ken Zuckerman ■ Marvin Zweier

Dinosaur Ball '89: Saluting Children and Families. George C. Page has often remarked that he built the Page Museum for the children of Los Angeles. It is particularly fitting that this year's Dinosaur Ball—which was held on April 15 and was the first to be given at the Page Museum—salutes the children and families who benefit from educational programs at both the Page and the Natural History Museums. Proceeds from the black-tie event fund educational outreach efforts such as the Moveable Museum, the School Tours Program, and the Annual Folk Art Festival, and support educational facilities such as the Ralph M. Parsons Discovery Center. Four Discovery Sponsors recognized at the ball have made substantial gifts to the educational program:

May Company California
ARCO
Mr. & Mrs. Roy Nutt
Mr. & Mrs. Dan Pocapalia

The museum acknowledges the following donors who contributed to the success of the ball.

Absolut Vodka
Mr. & Mrs. Ed N. Harrison
Fred Hayman Beverly Hills
Mr. & Mrs. Kenneth Leventhal
Mrs. Maurice Machris
Piacere
Mr. & Mrs. James Stewart

The following Diamond Couples received a limited-edition *Tyrannosaurus rex* pin for their special support of the ball:

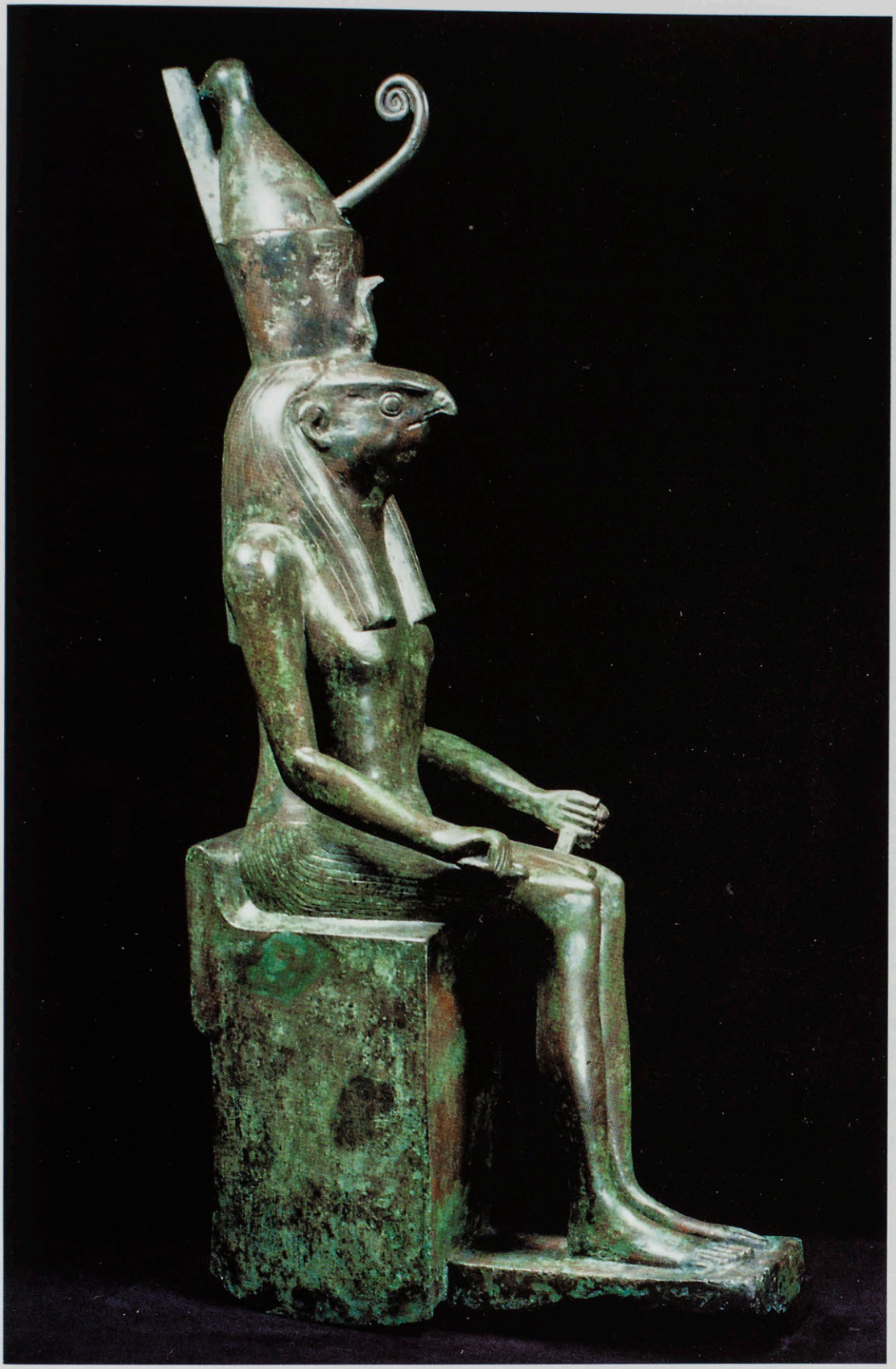
Mr. & Mrs. Robert Attiyeh ■ Mr. & Mrs. Sheldon Ausman ■ Mr. & Mrs. R. Stanton Avery ■ Mr. & Mrs. MacDonald Becket ■ Mr. & Mrs. Gordon Behn ■ Mr. & Mrs. Walter S. Berkman ■ Dr. & Mrs. Craig C. Black ■ Mr. & Mrs. Neal Brockmeyer ■ Liisa Ann Larson & Steven A. Buehler ■ Mr. & Mrs. George V. Caldwell ■ Dr. & Mrs. Richard Call ■ Mr. & Mrs. Ed Carson ■ Mr. & Mrs. James H. Cheney ■ Mr. & Mrs. Frederick Christie ■ Mr. & Mrs. Robert L. Cohn ■ Mr. & Mrs. Nathan W. Cohen ■ Mr. & Mrs. J. Joseph Connolly, II ■ Mr. & Mrs. Arthur L. Crowe ■ Mr. & Mrs. Stanley Dashew ■ Mr. & Mrs. Patrick Doheny ■ Mr. & Mrs. John K. Duncan ■ Dr. & Mrs. Theodore Eckberg ■ Justice & Mrs. Robert Feinerman ■ Mr. & Mrs. Douglas Goodan ■ Mr. & Mrs. John Hancock ■ Dr. & Mrs. Irwin Harris ■ Mr. & Mrs. Ed N. Harrison ■ Mr. & Mrs. Allan Herbert ■ Mr. & Mrs. E. B. Hoggatt ■ Drs. Patricia & John House ■ Mr. & Mrs. Robert Irvin ■ Mr. & Mrs. Harry Irvine ■ Mr. & Mrs. David Jacobs ■ Mr. & Mrs. Marshall Kass ■ Dr. & Mrs. Lindbergh Kawahara ■ Mr. & Mrs. Mortimer Kline ■ Mr. & Mrs. Marvin Kristan ■ Mr. & Mrs. Kenneth Leventhal ■ Mr. Robert M. Leventhal ■ Mr. & Mrs. Ross Otter Leventhal ■ Mr. & Mrs. Ernest Lever ■ Mr. & Mrs. Marvin Lewis ■ Mr. & Mrs. Alan G. Lowy ■ Mrs. Maurice Machris ■ Mr. & Mrs. Kevin McBride ■ Mr. & Mrs. Ray McCullough ■ Mr. & Mrs. W. Owens Miller ■ Mr. & Mrs. William Mingst ■ Mrs. Fred Nason ■ Deborah Nickson ■ Mr. & Mrs. Roy Nutt ■ Mr. & Mrs. Stephen Onderdonk ■ Mr. & Mrs. A. F. Osterloh, III ■ Mr. & Mrs. Owen Patotzka ■ Mr. George C. Page ■ Mr. & Mrs. Dan Pocapalia ■ Mr. & Mrs. William Pollack ■ Mr. & Mrs. Stuart Raffel ■ Mr. & Mrs. Thomas Reddin ■ Mrs. Gordon L. Richardon ■ Mr. & Mrs. Sheldon Richman ■ Mr. & Mrs. Charles Rinsch ■ Mr. & Mrs. Kenneth Roath ■ Mr. & Mrs. Joseph Ryan ■ Mr. & Mrs. Hyman Savinar ■ Dr. & Mrs. Robert Sloves ■ Jeff &

This year the Natural History Museum's Dinosaur Ball was held at the George C. Page Museum, a branch of the Natural History Museum. George C. Page and Merle Kingsley dance in the prehistoric garden setting of the Page Museum.

Dick Meier

Continued on p. 46

royal-athena galleries *new york - beverly hills*



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Continued from p. 44

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Capital Campaign: Major Funding. The Natural History Museum salutes the Dan Murphy Foundation for a significant new gift to the **Times Mirror Hall of Native American Cultures.** As of March 15, nearly $2.2 million was achieved toward the $4.2 million goal for the hall.

The museum gratefully acknowledges the following gifts for the Capital Campaign:
The Albertson Foundation ■ Edith E. Allen* ■ Mr. & Mrs. Donald M. Barrows ■ Mr. Ralph Bovitz ■ Deloitte Haskins & Sells ■ Lisa L. Oishi & Thomas F. Desmond* ■ Ralph M. Parsons Foundation ■ Peat Marwick Main & Co. ■ John A. Nickols ■ Mr. & Mrs. Thomas Reddin ■ Mr. & Mrs. Charles Rinsch ■ Kathleen L. Rydar* ■ Mr. & Mrs. C. E. Ryker ■ Santa Anita Foundation ■ Eleanor B. Saxman* ■ P. Kevin & Candace L. Saxman* ■ Mrs. Ralph W. Schreiber ■ Michael P. & Marcia D. Simeoni* ■ Southern California Edison ■ The Textile Group of Los Angeles ■ Mr. & Mrs. Harry Tytle ■ Dr. M. Norvel Young ■ Honorable & Mrs. Evelle J. Younger

*In memory of Cecil Tullis

Restricted Gifts. The Natural History Museum is pleased to acknowledge contributions to further the scientific research and outreach of the museum's distinguished curatorial staff.
Botany: Morton & Sophia Macht Foundation, Inc.
Entomology: Frederick B. Turner; Mr. & Mrs. James A. Robertson
History: James D. Olson
Ornithology: Mr. and Mrs. Edmund Brettschneider, Mr. & Mrs. Alvin Milder, Jean Brandt, Jennie P. Boynton, Cathleen R. Cox, Dr. Richard Bradley
Malacology: Edith M. Abbott
Mammalogy: Mrs. Reese H. Taylor
The Irving and Jean Stone Prize for Science Writing: Because one of the museum's primary concerns is science education for the general public, the Irving and Jean Stone Prize for Science Writing will be awarded to the writer who best communicates science to the general public. The recipient will be selected by an international committee of scientists and science writers. The $25,000 annual award will be given for the first time in the late fall of 1989. Recent contributors to this endowment are Mr. and Mrs. Dan Pocapalia, Mr. and Mrs. John K. Duncan, and Norman Cousins.

The museum also acknowledges a generous gift from Mrs. G. Allan Hancock to the George C. Page Museum of La Brea Discoveries.

Exhibition, Education, and Special Project Underwriting. Through the generosity of the following underwriters the museum is able to plan and present the diverse exhibitions and educational programs for our visitors from southern California and around the world:
Festival of Animals
(Opened March 25, 1989) Biota Gallery and Roundelay Productions
Dreamings: The Art of Aboriginal Australia
(Opened May 13, 1989) Westfield Inc./Westside Pavilion, Caz Gallery, AAM Inc., Vivitar, Ansett Airlines, and East-West Airlines
Folk Art Festival
(June 4, 1989) Pacific Enterprises; *Country Home* Magazine; JCPenney; Aaron Brothers Art Marts
Education
Hope Chevalier, Florence P. Hamilton Foundation, Yone & Lindbergh Kawahara, KIT Manufacturing, James D. Olson
Free Day
(First Tuesday of each month) ARCO, Northern Trust of California

Business Associates. Business Associates Chairman James H. Cheney has formed an executive committee of community leaders to assist in developing corporate support for the museum. Executive committee members include:
Peter K. Barker, Goldman Sachs & Company ■ Neal Brockmeyer, Kindel & Anderson ■ Stuart Fishler, Russell Reynolds Associates ■ John D. Jones, United Business Interiors ■ Thomas E. Larkin, Jr., Trust Company of the West ■ Dan L. McGurk ■ John D. Moore ■ Stephen O. Onderdonk, Econolite Control Products, Inc. ■ Charles O. Parker II ■ Robert Patterson, Laventhol & Horwath ■ Keith Russell, Glendale Federal ■ Joseph Ryan, O'Melveny & Myers

Fellows. The Fellows of the Natural History Museum have enjoyed a year full of adventure and discovery. Highlights included two exclusive Colombian expeditions featuring helicopter travel to an emerald mine and a lost city, a trip to Washington, D.C. complete with diplomatic reception and behind-the-scenes exploration of the Smithsonian, monarch butterfly tagging in Santa Barbara, and a private visit to Palomar Observatory and a tourmaline mine. The special arrangements at each destination are possible only through the professional and social contacts of museum staff and members of the Fellows. The museum welcomes the following new Fellows:
Gloria & Glen Holden ■ Mrs. Yaye Karasawa ■ Dr. & Mrs. David Landers ■ Mr. & Mrs. Lynwood L. Liddell ■ Sherry L. Lombardi ■ Mrs. Andrew M. Martin ■ Mr. & Mrs. Richard Neu ■ Mr. & Mrs. Leonard A. Rosenberg ■ Dr. & Mrs. Ronald Roth ■ Phyllis & Douglas Shamberg ■ Mr. & Mrs. Leslie Waite

MEMBERSHIP NEWS

Open House: A Great Success. On February 10, 1989, 2,800 members and guests attended the annual Open House at the Natural History Museum. A long line formed around Dinosaur Island as Omar Sharif, screen star and narrator of the **Nomads: Masters of the Eurasian Steppe** Acoustiguide tour, made a special guest appearance and autographed **Nomads** posters. Betsy Palmer, screen star and narrator of the sound portion of the exhibition of **Chaparral: Story of Life from Fire,** greeted visitors at the Botany display in the Chaparral Hall. A popular destination

Dr. J. D. Stewart (right), the museum's Assistant Curator of Vertebrate Paleontology, demonstrates the casting of a Tyrannosaurus rex *skull to interested museum members at the museum's annual Open House. Photograph by Christopher Barr Photography.*

was the newly opened exhibition **Nomads: Masters of the Eurasian Steppe,** which members attending the Open House were among the first to view. Members enjoyed miniature ice cream bars and bottled water, generously donated by the Haagen-Dazs Company, Inc., and Sparkletts. Haagen-Dazs is the first corporate sponsor of Open House.

Highlights of the 1989 Open House included the History Division's special display of the Medal of Honor, presented posthumously to David M. Gonzales; Vertebrate Paleontology's demonstration of the casting of our *Tyrannosaurus rex* skull, and Entomology's display of specimens, including exotic beetles and butterflies, in the Discovery Center Mezzanine, future site of **Through the Insect Realm,** the museum's live insect zoo.

Sponsoring and Supporting Members Events. During the next year, Sponsoring and Supporting members will be enjoying a series of events that will highlight the museum's upcoming exhibitions. In the fall, we are planning a private walkthrough of one of our unique curatorial departments. Our spring event will feature a special reception and tour of an artist's studio. On a recent

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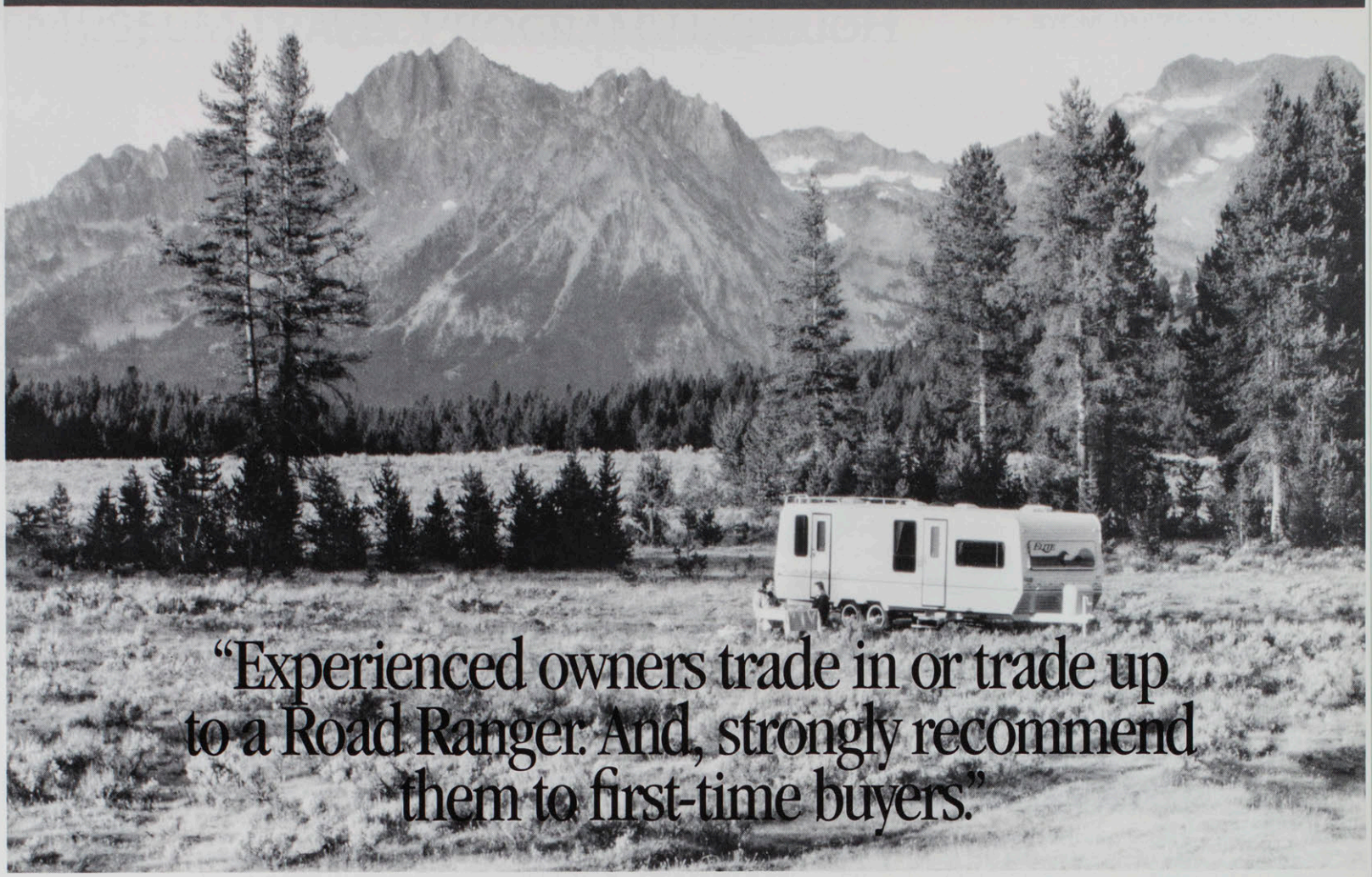

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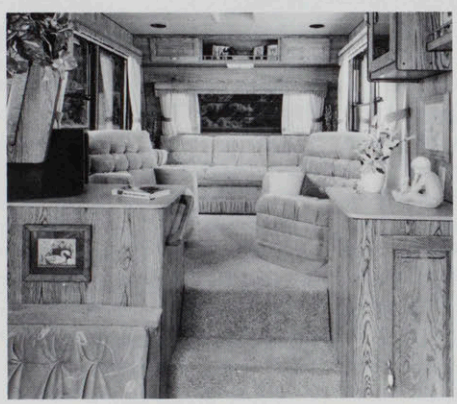
The livingroom. Wide vista windows with mini-blinds, dramatic skylights, color-coordinated drapes, valances, carpets, and much, much more.

The bedroom. Lighted cedar closets, luxurious bedspread with matching drapes, and a wonderful storage area under the bed with an easy fingertip hydraulic lift for effortless operation.

The bathroom. A striking skylight accents the bathtub/shower. The beautiful vanity and sink compliment the gleaming triple mirrors.



The kitchen. Ceramic tiled counter tops surround the double sink and real wood cabinets. A large, slide-out food pantry, a dinette storage drawer for pots and pans, a convenient metal-lined knife drawer. Just some of the extra helpmates to make cooking a delight.

Inside...Everything and we mean everything, is tested and re-tested.

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Continued from p. 46

March afternoon, Sponsoring and Supporting members enjoyed an inspirational visit with Dr. Vladimir Basilov, Head of Asian Studies at the Institute of Ethnography, Academy of Sciences, U.S.S.R., as he led them on a private tour of **Nomads: Masters of the Eurasian Steppe.**

For more information on becoming a Sponsoring or Supporting member, please call the Membership office at 213/744-3426.

ANNOUNCEMENTS

Through the Insect Realm. The museum's planned Insect Zoo needs a variety of good-quality glass containers to house backup insect colonies. Aquaria of any size, one quart canning jars, and one gallon jars with tight-fitting lids will provide excellent homes for our new museum residents while the exhibit is under construction. If you have any of these items gathering dust in your garage, storage area, or work space, please contact Dr. Art Evans, 213/744-3559.

Index to TERRA Volume 26 Available. A comprehensive subject index to Volume 26 of TERRA is now available through the Natural History Museum's Publications Office. Please contact the office at the Natural History Museum, 900 Exposition Boulevard, Los Angeles, CA 90007, if you would like to receive a copy. Indexes to volumes 22 through 25 are also available.

Erratum. Yom Kippur, which in 1989 falls on October 9, was inadvertantly omitted from the 1989 Wall Calendar (the November/December issue of TERRA). TERRA's editor regrets the error.

HOUSECALLS

Don Meyer

This three-foot-long fossil halibut, which is approximately 10 to 12 million years old, was excavated from Gaviota State Beach by the museum's paleontologists, personnel from Santa Barbara City College, and the State Department of Parks and Recreation.

The museum's curators are often asked to identify artifacts and specimens that people have found, purchased, or inherited and animals, plants, minerals, and fossils that they have encountered in their yards or at the beach or on a hike. "Housecalls" is a feature of TERRA in which the museum's curatorial staff will discuss interesting questions that the museum's members and the general public have frequently asked them.

The Fossil Fish that Almost Got Away

Q: We think we have found a 3-foot-long fossil fish in a seacliff. Can you identify it and tell whether it is of scientific importance? P.S. It's endangered by wave erosion at high tide.

A: In order to answer this question, two of the museum staff traveled to Gaviota State Beach in Santa Barbara County.

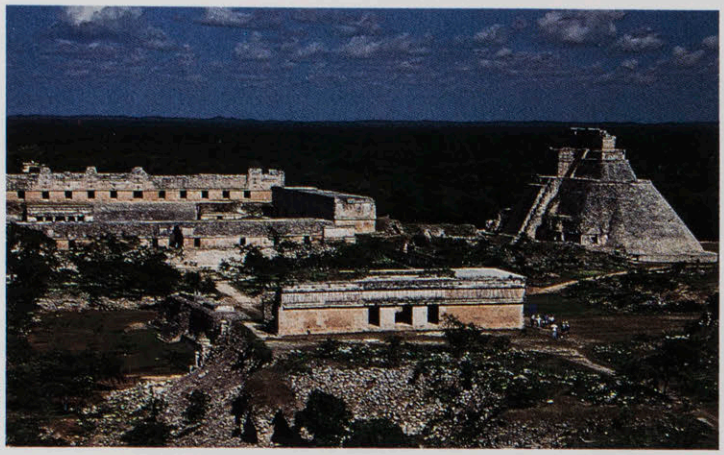
The Monterey Formation, the name given to the steeply tilting shale in which the fossil was found, dates from the latter part of the Miocene Epoch and is approximately 10 to 12 million years old, according to Dr. Lawrence G. Barnes, Curator and Section Head of the Section of Vertebrate Paleontology . Dr. J. D. Stewart, Assistant Curator of Vertebrate Paleontology, reported that the fish in question belongs to the genus *Paralichthys*, the same genus as the living California Halibut, *Paralichthys californicus*. The museum has hardly more than a dozen fossils of this fish, and all but one of these consist of a single bone or ear stone (otolith). The Gaviota *Paralichthys* is a skeleton missing only part of the dorsal fin and the majority of the head. The specimen is definitely of scientific interest because it is one of the oldest fossils and probably the most complete known of this genus. Study of this and other specimens may eventually tell us whether this group of halibuts has changed detectably over the last 12 million years.

The fossil was discovered in late 1987 by a visitor to Gaviota State Beach. After a disastrous storm in January 1988, the staff at Refugio State Beach Headquarters in Goleta conferred with Syd Brown, geologist for the State Department of Parks and Recreation, and decided it was time to remove the fossil. Personnel from the museum, from Santa Barbara City College, and from the State Department of Parks and Recreation cooperated in the excavation, using jackhammers, power saws, and hand tools. Because of very hard rock and submersion at high tide, the excavation of the 500-pound specimen took three days. Dr. Robert Gray and William Harz of Santa Barbara City College did much of the work. By mutual agreement, the specimen remains the property of the Department of Parks and Recreation, but is on loan indefinitely to our museum. Reproductions of the halibut in its slab of rock were made by the museum and provided for educational and exhibit purposes to Refugio State Beach Headquarters, to Santa Barbara City College, and to the Santa Barbara Museum of Natural History.

Halibut, flounders, tonguefish, turbot, and sole belong to the order Pleuronectiformes, commonly known as flatfish. One of the characters uniting the members of this order is a bizarre transformation. When the fish are quite young, they undergo a mind-boggling change from a normal fish appearance to an asymmetrical shape with both eyes on the same side of the head. They then habitually live with the blind side, whether left or right, facing or lying upon the sea floor.

Scientists from the Section of Vertebrate Paleontology frequently receive public inquiries concerning vertebrate fossils, but unfortunately, they cannot always make special trips into the field to identify them.

MUSEUM TRAVEL PROGRAM



Bill Gass

A view of the Maya City of Uxmal from the Great Pyramid.

A Voyage of Consequence: Southeast Alaska Whale Research Expedition

August 2–12, 1989

When you sign on for an Intersea Research Expedition, you sign on for a voyage of consequence. Aboard the luxury yacht *Acania,* launched in 1929, you will experience firsthand the thrill of discovery in one of the most exciting fields of oceanography — marine mammal science. You will see and learn about the great whales: their habits, their predators, and their prey. Your ten-day voyage will circumnavigate Admiralty Island, the "fortress of the bears." You will take shore excursions to ice caves, gold mines, hot springs, and sea lion rookeries and anchor each night in a different secluded bay, fjord, or inlet.

$2,495 plus airfare ($454).

Grand Canyon Prehistory

September 9–15, 1989

Western Grand Canyon, with its labyrinth of side canyons, remains one of the few pristine regions of the southwest. In this rugged and seemingly hostile environment, you will have the rare opportunity to explore sheer cliff faces sheltering undisturbed archaeological sites, lush springs, and meandering streams. Much of your time will be spent on the river, and you will experience a few lively rapids, but there will be ample time to hike and explore, often retracing prehistoric routes.

$750, including train fare.

Art and Treasures of Turkey

September 23–October 7, 1989

Turkey is a country of subtle beauties . . . a nomad's tent; the incredible blue of the Aegean Sea; a caravan of gypsies in their picturesque wagons; the sun setting into the Golden Horn, seeming to turn the water into gold and thus giving the river its name. Turkey is the geographical and cultural bridge between Europe and Asia, a country with the spiritual and architectural heritage of the three great monotheistic religions: Judaism, Christianity, and Islam, a panorama of 7,000 years of human history and creativity.

$3,535, including airfare.

Yucatan: Land of the Ancient Maya

December 3–16, 1989

Explore the magnficent Maya ceremonial centers of Uxmal, Chichén Itzá, Tulúm, and Palenque. Highlights include the richly decorated palace of Sayil, the exquisitely sculpted masks at Kohunlich, and the colossal Olmec sculptures at La Venta Park. For a change of pace, you will also have a relaxing mid-tour respite at the undiscovered coastal resort of Akumal and a visit to the distinctly Spanish city of Mérida. Each site has been carefully chosen to reveal a different facet of the history, religion, and art of the fascinating Maya and Olmec civilizations.

$2,240 plus airfare ($411).

Christmas in Santa Fe

December 23–30, 1989

New Mexico is a land of distant horizons, majestic mountains, and natural wonders with a living history that extends over seven centuries. Santa Fe, the capital, is the oldest continually used seat of government in the United States (it was founded in 1610). Its cultural heritage — Indian, Spanish, Anglo — is visible in the art, architecture, food, crafts, and daily way of life. On Christmas Eve, thousands of *farolitos* (small lanterns) glow on rooftops. You will view the Christmas Day dances at Santo Domingo as well as the Turtle Dance at San Juan Pueblo.

$1,608, including airfare.

Project Antarctica

January 15–19, 1990

Experience the highlight of a lifetime — the ice-sculpted beauty of Antarctica's remote continent — as you visit blue-hued glaciers, islands teeming with penguins and seals, and breathtaking fjords. Your expedition will take you to Puerto Williams, Cape Horn, Drake Passage, and the Antarctic Peninsula aboard the *World Discoverer.*

From $5,310, plus airfare.

Jungle Rivers of South America

April 6–24, 1990

Your cruise begins on the sunny island of Barbados, then continues along the langorous Orinoco River into the heart of the Venezuelan jungle. Departing the Orinoco, you'll visit Devil's Island, then cross the equator at the mouth of the mighty Amazon and begin your exploration upriver aboard the *Society Explorer.* Frequent landings will be made to visit isolated villages, view colorful birds and butterflies, and to hike into the jungle.

From $4,940, plus airfare.

For complete brochures about trips listed, please contact Karen Hovanitz, Museum Travel Program Coordinator, Natural History Museum, 900 Exposition Boulevard, Los Angeles, CA 90007. Phone 213/744-3350.

BOOK REVIEWS

MISSING LINKS: THE HUNT FOR EARLIEST MAN
by John Reader.
Pelican Books, second edition, $7.95 (paper).

The first American edition of this book was published in 1981 by Little, Brown and Company. It was very favorably received and the reviewer for *Nature* (quoted on the cover of the second edition) thought it "The best popular account of paleoanthropology I have ever read, which also makes a stimulating and original contribution to the science."

Reader's readers were treated to a well-written, historically accurate account of the discovery and interpretation of the relatively few significant specimens that have contributed so much to our present understanding of early human evolution. Individual chapters dealt with Neanderthal man, Java man, Peking man, and "Piltdown man," but well over half the book was devoted to materials from Africa (Olduvai, Laetoli, Hadar, Koobi Fora, and the South African localities). The most striking feature of the book was its superb color photographs of the specimens themselves—which, alone, made the book well worth its price ($19.95).

A second edition has recently been released in paperback form. The original text has been revised and augmented to include new discoveries made during the past decade and new techniques and interpretations that have assumed importance during this interval. The new edition has an extra chapter (Neanderthals and Modern Man) and additions to most of the others, providing the reader with an up-to-date and comprehensive treatment of the subject.

The new edition is just as readable as the first and is an ideal introduction to early human fossils and the people who discovered them. The cheaper price ($7.95) of this edition makes it readily affordable. Unfortunately the lower price was in part achieved by reducing the number of photographs and cutting out color entirely. I'm glad I have *both* editions!

John M. Harris
Chief Curator
Division of Earth Sciences

ITINERANT PHOTOGRAPHER: CORPUS CHRISTI, 1934
by Sybil Miller with an afterword by Bill Stott.
University of New Mexico Press, 1987, $24.95 (paper).

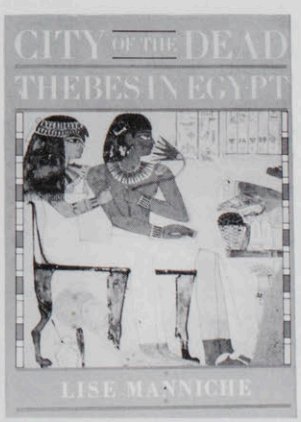
When we attempt to imagine sympathetically life during the Great Depression, we inevitably think, rightly or wrongly, almost exclusively in terms of that decade's justly praised photographic depictions of the period's poverty, deprivation, and suffering. The photographers, now legendary among photohistorians and photojournalists, who captured these unforgettable scenes in such an artfully plain yet politically loaded naturalistic style included, among others, Margaret Bourke-White and Horace Bristol, and such Farm Security Administration photographer-artists as Gordon Parks, Berenice Abbott, Roy Stryker, Walker Evans, Dorothea Lange, Russell Lee, Arthur Rothstein, and Ben Shahn.

In *Itinerant Photographer,* Sybil Miller manages to offer as a corrective to the popular notion of the 1930s as a decade of ubiquitous and omnipresent storm and strife a more prosaic view of that nevertheless turbulent era and in the process to accomplish two related tasks. She traces the history of the traveling photographer in the United States from the daguerreian era to the present, and she posits a reasonably convincing argument for the social and historical importance of these overlooked vernacular photographers through a graphic and textual analysis of one anonymous itinerant's photographs of Corpus Christi, Texas, in 1934.

The 170 reproductions that appear in *Itinerant Photographer* come primarily from the 5 by 7 inch glass-plate negatives and prints of a nameless Corpus Christi photographer that now form a small part of the John McGregor photo-archive divided between Corpus Christi and the University of Texas at Austin. The appendix contains a similar selection, but smaller number of photographs of the good citizens of Albuquerque, New Mexico, in 1930 that now form part of the Ray Bandell Collection of the Albuquerque Museum. A valuable and illuminating afterword has been added by Ms. Miller's Master's thesis director, Bill Stott of the University of Texas, Austin, who, as William Stott, wrote *Documentary Expression and Thirties America* (Oxford University Press, 1973), a landmark work indispensable to an understanding of a crucial facet of the cultural history of that watershed era.

The photographs and accompanying text in *Itinerant Photographer* should serve to remind the thoughtful reader that what we consider the historical record is more often than not drastically limited to what historians of a particular later era consider stimulating, interesting, or significant. While a picture isn't necessarily worth a thousand words—a perhaps rhetorically compelling but nevertheless empirically unsatisfying notion—a postmodern argument could be mounted, based on works as fine as *Itinerant Photographer,* that a great deal more than one might imagine can be learned from a photograph if one is willing to give it the deep reading that one would accord any literary text.

D. M. Debs
Transportation & Communications Section
History Division



CITY OF THE DEAD: THEBES IN EGYPT
by Lisa Manniche.
University of Chicago Press, 1987, $24.95.

The beautiful private tombs in the hills across the Nile from Luxor (ancient Thebes) are almost reason in themselves to visit Egypt, and this author's new book illustrates this very well.

In the New Kingdom (1575–1087 B.C.), we learn Thebes was the religious and political center of the land. As a result, many important people lived, died, and were buried there. But even before that, Thebes attracted many inhabitants. Remains as early as the Naqada II period, in the veiled mists of Egypt's Predynastic times, are found there, and the site was already slowly growing as a center in Upper Egypt. Five tombs from the end of the third millennium B.C. have miraculously survived and belong to what the author calls the "cream of Thebian society."

During the Middle Kingdom a great tomb and temple were built for a king (or kings) named Mentuhotep. Now almost completely vanished, the temple inspired the familiar and beautiful mortuary temple of Queen Hatshepsut, which stands beside it at Deir el Bahri.

Many finds tantalize us. The tomb of Meketré gave up over twelve hundred tools and weapons—all in miniature, as well as a model of his estate. In the tomb of Wah, nearby, the undefiled mummy was wrapped in 845 square meters of linen. And the tomb of Antefoker may actually be that of a lady, Senet, unique because women in ancient Thebes seem to have had no tombs of their own.

There is much more. Tomb plans are shown, and the scenes of fishing, fowling, hunting, agricultural pursuits, funerals, and feasts are explained. In the time of the Ramessid kings, an orthodox reaction to the heresy of Akhenaten caused the scenes of daily life to be replaced by funerary texts and vignettes from the Book of the Dead. And some tombs have vanished completely, known only from early explorers' records or from fragments scattered around the world in museums and private collections.

You will want to read this book before you go to Egypt. It is even thin enough to take along. You can read it on the airplane, or on the veranda of the Winter Palace Hotel in Luxor, while you sip mint tea and watch the foluccas sail slowly up the Nile.

Jay Bisno
Curatorial Assistant
Anthropology Section

FOCUS ON THE WEST

At the turn of the century, Frederic H. Maude, a Los Angeles landscape photographer, took this picture of an aging Luiseño Indian at the Soboba Reservation in Riverside County. The man sits next to a zanja, or irrigation ditch, and is probably the keeper. The Luiseño once populated a 1,500 square-mile section of coastal southern California between Los Angeles and San Diego. The tribe took its name from the San Luis Rey mission with which they were associated. During the Mexican and American periods the Luiseño lost most of their traditional lands. Today, about one-third of the Luiseño reside on the La Jolla, Pauma, Pechanga, Pala, and Soboba reservations. The remainder live throughout southern California.

General Photo File 5786

Focus on the West: Images from the Seaver Center *is a* TERRA *feature that presents the photographic highlights of the museum's Seaver Center for Western History Research. The Seaver Center is rich in photographs and other materials relating to the history of the American West.*

Dreamings

CATALOG ACCOMPANIES SPECIAL EXHIBITION

The Art of Aboriginal Australia
May 13–August 6, 1989

The Aborigines have occupied the Australian continent for at least 40,000 years. One of the best-known but least understood peoples of the world, they had already developed a rich and subtle culture in prehistoric times. Their artistic tradition, which is an important manifestation of this heritage, also dates to this period and is the oldest in the world.

Dreamings: The Art of Aboriginal Australia presents a comprehensive overview of Aboriginal art and aesthetics as they are integrated within a distinctive Aboriginal tradition. The catalog, which accompanies the ***Dreamings*** exhibition, includes over 300 illustrations and 155 color plates. To order your catalog, call the MUSEUM BOOKSTORE at 213/744-3434.

Also in conjunction with the current exhibition, the ETHNIC ARTS SHOP offers a diverse selection of contemporary Aboriginal art including bark paintings and wood carvings.

Natural History Museum of Los Angeles County
Exposition Park, Los Angeles, California 90007